CONTRACT NO. N68711-98-D-5713
CTO NO. 0023

FINAL

PROJECT CLOSEOUT REPORT

Revision 0
April 25, 2003

NON-TIME-CRITICAL REMOVAL ACTION
INSTALLATION RESTORATION SITE 5
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

DCN: FWSD-RAC-03-0189

Southwest Division
Naval Facilities Engineering Command
Contracts Department
1220 Pacific Highway, Building 127, Room 112
San Diego, CA 92132-5190

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Prepared by:

FOSTER WHEELER ENVIRONMENTAL CORPORATION

1230 Columbia Street, Suite 500
San Diego, CA 92101

Hamlet H. Hamparsumian
Project Manager

Jamshid Sadeghipour, Ph.D., P.E.
Deputy Program Manager

EXECUTIVE SUMMARY

This Closeout Report describes the implementation of a Non-Time-Critical Removal Action (NTCRA) for Installation Restoration Program (IRP) Site 5, former Clean Fill Disposal Area located at Naval Weapons Station (NAVWPNSTA) Seal Beach, California (Figures 1-1 and 1-2). The Department of the Navy (DON), Southwest Division Naval Facilities Engineering Command (SWDIV) determined (upon review of the IRP Site 5 operational history and site-specific investigative data) that the site contained a disposal/fill area comprised of a mixture of soil, debris, and ordnance-related items. The DON initiated the removal action at IRP Site 5 due to the potential for ordnance and explosive (OE) items in the disposal/fill area. The intent of the removal action was to prepare the site for future consideration of No Further Action status. Under the DON's directive, Foster Wheeler Environmental Corporation (FWENC), as General Contractor, conducted the removal action at the site under the DON Contract Task Order (CTO) No. 0023 of the Remedial Action Contract (RAC) Program, Contract No. N68711-98-D-5713. The removal action was conducted in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requirements.

CERCLA does not specifically address ordnance items as hazardous substances. Response actions to address ordnance items require a different approach to balance the risks and impacts of ordnance items with risk of inaction. The DON performs cleanup of ordnance items at its active facilities under the Defense Environmental Restoration Program using the CERCLA process. Thus, for purposes of this NTCRA, the CERCLA process has been modified to address issues specific to removal of ordnance items. The removal action did not address chemical contamination in soil, sediment, or groundwater because chemicals present were not at levels that would pose a threat to human health or the environment [Bechtel National, Inc. (BNI), 2001a].

The DON initiated the planned removal action at IRP Site 5 to substantially eliminate, prevent, or abate any potential hazards associated with the ordnance items. For purposes of this Closeout Report, "ordnance items" are military munitions as defined in Title 40 Code of Federal Regulations (CFR), Part 260.10 and associated inert scrap derived from such military munitions. The military munitions may potentially include OEs. It is anticipated that no further action will be required at this site after completing the implementation of the planned removal action.

IRP Site 5 consisted of an irregularly shaped area located in the southwestern portion of NAVWPNSTA Seal Beach, within the boundaries of Seal Beach National Wildlife Refuge (SBNWR). The disposal fill contained ordnance items and covered an area of approximately 4.1 acres. The site was in an upland area characterized by grasses and shrubs on an irregular surface of soil and concrete/asphalt debris. The site was bordered on the north, east, and south by

a salt marsh. The surface of the disposal/fill area varied in elevation from 1 to 5 feet above the grade of the adjacent wetlands. Two rail lines and Kitts Highway define the western boundary of IRP Site 5.

IRP Site 5 was initially used in 1944 as a disposal area for construction debris and clean fill during the construction of NAVWPNSTA Seal Beach. Ordnance items were reportedly found at the site, and trucks were observed in the past off-loading ordnance-related material such as shell casings mixed with construction debris.

The surface lithology at IRP Site 5 consisted of fills composed of silts and sands with varying amounts of man-made materials to a depth of approximately 5 feet below ground surface (bgs). Two types of fill material were identified at IRP Site 5: disposal fill and construction fill. The disposal fill contained varying amounts of concrete and asphalt debris, metallic objects of varying size, rusted metal fragments, broken glass, trash, ordnance items, wood, and other miscellaneous debris. The construction fill contained only trace amounts of man-made materials, which did not contain any ordnance items and seemed to be related to the construction of the rail lines and Kitts Highway along the western portion of the site.

A series of environmental investigations were conducted between 1985 and 1998 to assess the potential environmental impacts of past site operations. In 1998, the DON initiated a Removal Site Evaluation (RSE) to determine contaminant levels within disposal area soils, the salt marsh, and groundwater at IRP Site 5. Soil samples (from the disposal area), sediment samples (from the salt marsh area), and groundwater samples were all analyzed for nitroaromatics and nitramines (explosives), semivolatile organic compounds (SVOCs), polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and metals. In addition, soil and groundwater samples were analyzed for volatile organic compounds (VOCs) and hexavalent chromium (BNI, 2001b).

VOCs reported in IRP Site 5 soils were present at concentrations lower than the industrial Preliminary Remediation Goals (PRGs) [United States Environmental Protection Agency (EPA), 1998], and VOCs in groundwater were reported at concentrations less than California Ocean Plan (COP) objectives and the Ambient Water Quality Criteria (AWQC) for saltwater. For SVOCs, PAHs, PCBs, and explosives testing, three PAHs (benzo[a]pyrene, benzo[b]fluoranthene, and dibenz[a,h]anthracene) were reported in soil samples at concentrations equal to or greater than the 1998 industrial PRGs. In groundwater, benzo[a]pyrene, benzo[g,h,i]perylene, and pyrene were reported at concentrations exceeding the COP objectives and the AWQC saltwater criteria (BNI, 2001b).

Eight metals (antimony, arsenic, cadmium, chromium, cobalt, copper, lead, and zinc) and hexavalent chromium were reported above statistical background levels in the soils from the disposal area. Of these metals, arsenic, cadmium, chromium, and cobalt were not detected at concentrations above the geochemical background level. Antimony, copper, lead, and zinc were

reported at concentrations that were above the geochemical background levels. Nine metals (arsenic, cadmium, copper, cobalt, lead, nickel, selenium, vanadium, and zinc) were reported above statistical background level in the sediments. Of these nine metals, arsenic and lead were reported at a concentration equal to or greater than the 1998 industrial PRG (BNI, 2001b).

Results of unexploded ordnance (UXO) survey, conducted by BNI (BNI, 2001b) indicated the presence of ordnance items and scrap metals at and below ground surface within the disposal fill The UXO survey concluded that additional magnetic anomalies existed at IRP Site 5 and that OE items may still be present (BNI, 2001b).

A radiological walkover survey was also conducted during the RSE Results indicated that radiation levels within the disposal area were well within the background range (BNI, 2001b).

Human health risk assessment results indicated that total and incremental excess lifetime cancer risk for a United States Fish and Wildlife Service (USFWS) restoration/maintenance supervisor and tour guide exposed to soils and volatile compounds originating from the groundwater were estimated to be within the NCP target risk range for health protectiveness (10^{-6} and 10^{-4}) at 2.4 x 10^{-6}/3.7 x 10^{-6} and 5.1 x 10^{-6}/8.2 x 10^{-6}, respectively. The hazard index for a USFWS habitat restoration/maintenance supervisor and tour guide exposed to soil at the site is less than 1.0, indicating that systemic toxicity is unlikely (BNI, 2001b).

Based on the results of the ecological risk assessment, the potential for ecological risk at this site appeared to be low (hazard quotient less than 1) (BNI, 2001b). Of the five species of birds that are listed as endangered by either federal or state agencies and are known to occur at NAVWPNSTA Seal Beach and the associated wetlands, the state-listed Belding's savannah sparrow is thought to potentially occur in the upland area of IRP Site 5.

The Final RSE Report (BNI, 2001b) determined that the chemical contamination in soils, sediments, or groundwater at IRP Site 5 were not at levels that would pose a threat to human health or the environment. Based on the results and conclusions of the fate and transport evaluations in the RSE and the ecological risk assessment, no further action is recommended for the soils, sediments, and groundwater. However, further evaluation in the form of confirmatory groundwater monitoring is recommended for the sediments to assess whether chemicals of potential concern (COPCs) in the sediments are affecting groundwater.

Following the RSE, BNI prepared the Final Engineering Evaluation/Cost Analysis (EE/CA) Report (BNI, 2001a) to identify and evaluate removal action alternatives for addressing ordnance at IRP Site 5. The Final EE/CA (BNI, 2001a) did not address chemical contamination in soil, sediment, or groundwater at IRP Site 5, because, as it is indicated in that report, the chemicals present at IRP Site 5 were not at levels that would pose a threat to human health or environment. However, because the UXO survey indicated that the potential hazard associated with ordnance items may still exist at the site, it was recommended that the site be further evaluated for

ordnance items (BNI, 2001b). A qualitative risk evaluation was performed by BNI as part of the Final EE/CA (BNI, 2001a), with focus on hazards to human health and the environment associated with ordnance items. Risk was evaluated using the Risk Assessment Procedures for Ordnance and Explosive Sites worksheet from the United States Army Corps of Engineer's (USACE's) Ordnance and Explosives Response engineering pamphlet (USACE, 2000), whereby hazard severity and hazard probability are assigned based on numerical rating scores.

The risk evaluation results indicated that the hazard severity category was "critical." In addition, the hazard probability level was "probable." Therefore the risk evaluation findings indicated that further action was warranted (BNI, 2001a).

According to the Final EE/CA (BNI, 2001a), human exposure to ordnance items at IRP Site 5 was considered to be limited. Workers conducting intrusive activities and/or removal activities would be at the greatest risk. The Final EE/CA (BNI, 2001a) also indicated that surface clearance of ordnance items were performed during the RSE and, therefore, the chance of triggering an explosive device while traversing the site was considered minimal, although it could not be ruled out. Non-human organisms that lived on or otherwise use IRP Site 5 could be impacted if an explosion occurred or if any response activity took place to address ordnance items still present at the site (BNI, 2001a).

The Final EE/CA (BNI, 2001a) also identified the removal action objectives (RAOs) and scope, which were used to define and evaluate removal action alternatives. The primary objective of the removal action proposed in the Final EE/CA (BNI, 2001a) was to protect human health and the environment. Potential applicable or relevant and appropriate requirements (ARARs) were identified and evaluated to assist in determining RAOs. The RAOs were developed based on statutory explosive safety and environmental response authorities in Defense Environmental Restoration Program, 10 United States Code 172, and CERCLA to address risks posed by ordnance items, risk evaluation results, and ARARs.

The Final EE/CA (BNI, 2001a) identified two RAOs for IRP Site 5. The first RAO was to reduce the risk to humans from potentially explosive ordnance items (to the extent practicable) in a manner that also minimized the safety risks to response specialists, was cost-effective, and complied with all ARARs. The second RAO was to minimize the impact to and preserve the existing beneficial uses of SBNWR. The DON developed an Action Memorandum/Removal Action Work Plan (AM/RAW) (SWDIV, 2001a) in order to document the need for a NTCRA. The AM/RAW (SWDIV, 2001a) identified the proposed action and explained the rationale for the removal.

The selected removal action for IRP Site 5 presented in the Final EE/CA (BNI, 2001a) and the AM/RAW (SWDIV, 2001a) consisted of complete removal of all ordnance items and construction debris. This alternative was selected because it greatly reduces risks to humans and the environment by completely removing on-site ordnance items. Following implementation of

this alternative, the land use will become unrestricted and the site can be restored and maintained as part of the SBNWR wetlands. This alternative also met the RAOs, complied with ARARs, and was technically and administratively feasible. Although this alternative had the highest cost of all the available alternatives, the AM/RAW (SWDIV, 2001a) concluded that there would be no unforeseen future costs, and the long-term benefits would far outweigh the initial costs.

The primary project objective was to minimize the physical hazards associated with OE items that are 20-millimeter (mm) diameter and larger, and, in the process, increase the surface area of the wetlands at IRP Site 5. The project objective was achieved by excavating and removing the disposal/fill area. OE and OE-related items (OE scrap, shell casings, and so forth) were located and removed by mechanical screening of the soil and by visual inspection and the use of metal-detecting instruments by trained, qualified UXO specialists. With the excavation of the disposal/fill area, the elevated area at IRP Site 5 was completely removed down to the adjacent wetlands' grade. This resulted in expanding the wetlands into the IRP Site 5 area.

The NTCRA activities conducted at IRP Site 5 included an initial ordnance surface clearance; vegetation clearing and grubbing; a topographic land survey, a pre-excavation geophysical survey, excavation of the fill area with concurrent sweep of the excavated areas with magnetometers; mechanical screening and sifting of the excavated material and inspection for the presence of ordnance; segregation and stockpiling of the screened material (soil, ordnance, and construction debris); ordnance identification and disposal; a post-excavation geophysical survey; loading, transportation, and disposal of all excavated contaminated soil, debris, and rubble; reuse of the screened clean/uncontaminated soil for grading the site; and site restoration. In addition to the OE-related removal activities, two groundwater monitoring wells that were installed at IRP Site 5 during previous investigations were abandoned.

The removal activities at IRP Site 5 began on September 17, 2001, and were completed by April 16, 2002. During this period, a total of approximately 26,700 cubic yards (or approximately 35,000 tons) of soil and oversized material were excavated and screened. Approximately 14,500 cubic yards (or 18,915 tons) of the screened soil and oversized material required off-site disposal. Approximately 7,500 cubic yards (or about 9,200 tons) of the screened soil was classified as non-hazardous and reused as backfill material at IRP Site 5. Approximately 4,000 cubic yards (or about 5,200 tons) of screened soil was classified as clean, containing metals at levels below the NAVWPNSTA facility-wide background concentration. This soil was trucked to a temporary stockpile area located north of IRP Site 7 for later reuse as cover material at that site. In addition, approximately 700 cubic yards (1,000 tons) of concrete was removed from the site and crushed into smaller sizes for reuse and recycling. The vegetation and debris that were generated during the excavation and screening activities were transported off site for disposal. All the material that was removed from IRP Site 5 (screened soil, oversized material, vegetation, and debris) was certified by FWENC as not containing energetic materials or items of a dangerous or hazardous nature.

All OE items removed by FWENC UXO specialists during excavation and screening operations were inspected visually. OE-related scrap metal was thermally flashed to consume any remaining energetic material, and subsequently, turned over to NAVWPNSTA Seal Beach for recycling by the Defense Reutilization and Marketing Office (DRMO).

OE determined by FWENC UXO specialists to be potentially live or as not safe to move were managed by notifying NAVWPNSTA personnel, who requested military explosive ordnance disposal (EOD) Mobile Unit 3, Detachment Southwest assistance. All other high-explosive OE items were temporarily stored at two magazines assigned by the NAVWPNSTA Seal Beach, and subsequently, were handed over to the EOD for demolition of the items, which were conducted at Building 95 located within NAVWPNSTA Seal Beach. The NTCRA resulted in the recovery of 1,083 OE items, 275 suspect OE or OE-related items, and approximately 7,000 pounds of OE scrap metal.

The excavation continued down to the native soils until it was determined that all OE and debris had been excavated. Afterwards, the excavation footprint was graded and the site was restored as part of the SBNWR wetlands. Following site restoration, construction equipment was demobilized and removed from the site.

During the RSE, several COPCs were reported in groundwater at concentrations above the groundwater screening criteria (station-wide background, COP Water Quality Objectives and/or EPA AWQC for Saltwater Aquatic Life Protection). Fate and transport modeling indicated that the COPCs, hexavalent chromium, manganese, ammonia, and nitrate, could continue to affect groundwater at the site above the groundwater screening criteria for the next 50 years; however, none of these COPCs are expected to affect the groundwater at a hypothetical point of discharge into the marine environment. Based on these conclusions, confirmatory groundwater monitoring was recommended for IRP Site 5. A Work Plan for groundwater monitoring at IRP Site 5 is currently under development by the DON.

The physical hazards associated with OE at IRP Site 5 have been mitigated within the removal area established per the scope of work for this project. It is therefore recommended that, except for conducting confirmatory groundwater monitoring and confirmation surface water and sediment sampling, IRP Site 5 be considered for No Further Action status.

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

APPENDICES

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

AA	anti-aircraft
AP	armor piercing
APT	armor piercing tracer
AM/RAW	Action Memorandum/Removal Action Work Plan
APCL	Applied P & CH Laboratory
ARAR	applicable or relevant and appropriate requirement
AWQC	Ambient Water Quality Criteria
bgs	below ground surface
BNI	Bechtel National, Inc
cal	caliber
CAT	Caterpillar
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COP	California Ocean Plan
COPC	chemical of potential concern
CQC	contractor quality control
CTO	Contract Task Order
DGPS	differential global positioning system
DoD	Department of Defense
DON	Department of the Navy
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
°C	degrees Celsius
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
ECDC	East Carbon Development Corporation
EE/CA	Engineering Evaluation/Cost Analysis
ELCR	excess lifetime cancer risk

ABBREVIATIONS AND ACRONYMS
(Continued)

EO	Executive Order
EOD	explosive ordnance disposal
EPA	United States Environmental Protection Agency
ESO	Explosive Safety Officer
FSI	Focused Site Inspection
FWENC	Foster Wheeler Environmental Corporation
HAZPAK	HAZPAK, Inc., Environmental Services
HE	high explosive
IAS	Initial Assessment Study
IDW	investigation-derived waste
IR	Installation Restoration
IRP	Installation Restoration Program
J	estimated value
JEG	Jacobs Engineering Group, Inc.
lb	pound
m^3	cubic meter
µg	micrograms
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mm	millimeter
msl	mean sea level
NA	not analyzed
NAD	North American Datum
NAVWPNSTA	Naval Weapons Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NTCRA	Non-Time-Critical Removal Action
OE	ordnance and explosive

ABBREVIATIONS AND ACRONYMS
(Continued)

ONYX	ONYX Environmental Services, LLC
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PD	probability of detection
PPE	personal protective equipment
PRG	Preliminary Remediation Goal
PVC	polyvinyl chloride
QC	quality control
RAB	Restoration Advisory Board
RAC	Remedial Action Contract
RAO	removal action objective
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RSE	Removal Site Evaluation
RWQCB	Regional Water Quality Control Board
SBNWR	Seal Beach National Wildlife Refuge
SCAQMD	South Coast Air Quality Management District
SOP	Standard Operating Procedure
STLC	Soluble Threshold Limit Concentration
SUXOS	Senior Unexploded Ordnance Supervisor
SVOC	semivolatile organic compound
SWDIV	Southwest Division Naval Facilities Engineering Command
TAL	target analyte listed
TCLP	Toxicity Characteristic Leaching Procedure
TSP	total suspended particulate
TTLC	Total Threshold Limit Concentration
U	not detected at or above reporting limit
ULBV	upper limit background value

ABBREVIATIONS AND ACRONYMS
(Continued)

UNK	unknown
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
UXO	unexploded ordnance
VOC	volatile organic compound
WBR	Waste-By-Rail
WET	Waste Extraction Test

1.0 INTRODUCTION

This Project Closeout Report describes the implementation of a Non-Time-Critical Removal Action (NTCRA) for Installation Restoration Program (IRP) Site 5, former Clean Fill Disposal Area at Naval Weapons Station (NAVWPNSTA) Seal Beach, located in Seal Beach, California (Figures 1-1 and 1-2). This project was authorized by the Department of the Navy (DON), Southwest Division Naval Facilities Engineering Command (SWDIV), under Contract Task Order (CTO) No. 0023 of the Remedial Action Contract (RAC) Program, Contract No. N68711-98-D-5713. The main purpose of the Closeout Report is to document the IRP Site 5 NTCRA, specifically: 1) the site conditions prior to the action, 2) the chronology and main phases leading to the removal action, 3) the implementation of various stages of the NTCRA, 4) the costs, and 5) the effectiveness of the NTCRA in achieving the removal action objectives (RAOs) established for IRP Site 5.

The DON, SWDIV, directed this NTCRA in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The DON, with state regulatory oversight, has been the lead agency for the removal action at this site. The California Department of Toxic Substances Control (DTSC) and Regional Water Quality Control Board (RWQCB), Santa Ana Region, have been providing state oversight.

This NTCRA has been conducted pursuant to the CERCLA and the NCP under the delegated authority of the Office of the President of the United States by Executive Order (EO) 12580. This order provides the DON with authorization to conduct and finance removal actions. SWDIV is the administering entity for the DON's CERCLA program at NAVWPNSTA Seal Beach and, as such, manages the activities specific to development and execution of the recommended removal alternative. Under the DON's directives, Foster Wheeler Environmental Corporation (FWENC), as General Contractor, conducted the NTCRA at IRP Site 5.

This section describes the facility and site location and provides a description of the past history of operations at IRP Site 5. This section also provides a brief discussion of the field data from previous investigations and includes a brief description of the nature and extent of the contamination along with a discussion of the risk to human health and the environment. A map of NAVWPNSTA Seal Beach, including the location of IRP Site 5, is shown in Figures 1-2 and 1-3.

1.1 PROJECT OBJECTIVE

The DON had determined (upon review of the IRP Site 5 operational history and site-specific investigative data) that the site contained a disposal fill area comprised of a mixture of clean fill material and construction debris, and ordnance-related items. Previous site investigations had determined that the potential existed for the presence of ordnance and explosive (OE) items in the disposal fill area, and the DON initiated the planned NTCRA at IRP Site 5 to minimize potential hazards associated with OE. The DON developed an Action Memorandum/Removal Action Work Plan (AM/RAW) (SWDIV, 2001a), in order to document the need for a NTCRA. The AM/RAW (SWDIV, 2001a) identified the proposed action and explained the rationale for the removal. The NTCRA at IRP Site 5 was conducted consistently with the recommended alternative in the AM/RAW (SWDIV, 2001a). The intent of the NTCRA was to prepare the site for future consideration for No Further Action status.

The disposal/fill area was located adjacent to wetlands and was within the boundary of Seal Beach National Wildlife Refuge (SBNWR) (Figure 1-3). The surface of the disposal/fill area varied in elevation from 1 to 5 feet above the grade of the adjacent wetlands.

The primary project objective was to minimize the physical hazards associated with OE items that are 20-millimeter (mm) diameter and larger and, in the process, increase the surface area of the wetlands at IRP Site 5. The project objective was achieved by excavating and removing the disposal/fill area. OE and OE-related items (for example, OE scrap, shell casings, and so forth) were located and removed by mechanical screening of the soil and by visual inspection and the use of metal-detecting instruments by trained, qualified unexploded ordnance (UXO) specialists. With the excavation of the disposal/fill area, the elevated area at IRP Site 5 was completely removed, thus establishing a grade comparable to the adjacent wetlands and expanding the wetlands area.

The implementation of the NTCRA at IRP Site 5 commenced on September 17, 2001, and was completed on April 16, 2002. This Project Closeout Report documents the field activities.

The scope of work performed at IRP Site 5 during the project included an initial ordnance survey; abandonment of two groundwater monitoring wells; vegetation clearing and grubbing; a topographic survey; a pre-excavation geophysical survey; excavation of the disposal/fill area with concurrent ordnance surveys; soil/debris screening and stockpiling; ordnance identification, certification, and disposal; a post-excavation geophysical survey; waste disposal (soil, debris, and so forth); and site restoration. Waste disposed off site was classified as non-ordnance related.

1.2 REPORT ORGANIZATION

This Project Closeout Report is divided into nine sections. Section 1.0 provides an introduction, as well as an overview of the project objective, scope of work, and report organization. Section 2.0 provides a description of IRP Site 5 and summarizes the site's history and background information. Section 3.0 discusses the previous investigations conducted at the site, risks to human health and the environmental, the applicable or relevant and appropriate requirements (ARARs), and the RAOs. Details of each aspect of the project field activities are described in Section 4.0. Section 5.0 provides a summary of the costs associated with this removal action. A brief discussion of public participation and involvement is provided in Section 6.0. Section 7.0 discusses the effectiveness of the NTCRA. Section 8.0 provides a brief discussion of the No Further Action recommendation for IRP Site 5. References are included in Section 9.0. Additional supporting documents are included in Appendices A, B, C, and D. Tables and figures are also included to supplement information in this report.

2.0 SITE BACKGROUND AND HISTORY

This section presents a description of the facility and site location and provides a summary of the past history of operations at IRP Site 5. The information provided in this section has been extracted from various sources, including the Final Engineering Evaluation/Cost Analysis (EE/CA) for IRP Site 5 prepared by Bechtel National, Inc. (BNI, 2001a) and the Final AM/RAW (SWDIV, 2001a).

Several investigations have been performed to assess the potential environmental impacts of past operations and disposal practices at NAVWPNSTA Seal Beach and IRP Site 5. Detailed descriptions of these investigations are provided in the Initial Assessment Study (IAS) Report [Naval Energy and Environmental Support Activity (NEESA), 1985], Resource Conservation and Recovery Act (RCRA) Facility Assessment Report (AT Kearney, Inc., 1989), Preliminary Assessment Report (NEESA, 1990), Final Facility-wide Site Inspection Report (SWDIV, 1990), Focused Site Inspection Report [Jacobs Engineering Group, Inc. (JEG), 1996], and the Final Removal Site Evaluation (RSE) Report (BNI, 2001b). The results of these investigations are summarized in the Final EE/CA (BNI, 2001a).

2.1 FACILITY LOCATION AND BACKGROUND

NAVWPNSTA Seal Beach is located about 30 miles south of the Los Angeles urban center. NAVWPNSTA Seal Beach consists of approximately 5,000 acres of land along the Pacific Coast within the city of Seal Beach in Orange County, California (Figure 1-1). NAVWPNSTA Seal Beach is bordered on the southwest by Anaheim Bay, on the north by Interstate 405 (San Diego Freeway), on the east by Bolsa Chica Road, on the west by Seal Beach Boulevard, and on the southeast by a flood control channel. Originally commissioned in 1944, NAVWPNSTA Seal Beach is part of the Navy Region Southwest, and its major claimant is the Commander United States Pacific Fleet. This station provides fleet combatants with ready-for-use ordnance. Because of its geographic location, the station serves as a supply point for the operating DON and Marine Corps forces in the southern California region. Figure 1-2 shows a map of NAVWPNSTA Seal Beach, including the location of IRP Site 5.

2.2 SITE LOCATION, AREA, AND STRUCTURES

IRP Site 5 consisted of an irregular-shaped, 4.1-acre disposal/fill area located in the southwestern portion of NAVWPNSTA Seal Beach, immediately southeast of the intersection of Kitts Highway and Bolsa Avenue (Figure 1-3). The disposal/fill area was located adjacent to wetlands and in the western portion of SBNWR, which provides essential habitat for the California least tern and light-footed clapper rail and maintains quality habitat for the California brown pelican, peregrine falcon, and Belding's savannah sparrow. The surface of the disposal/fill area varied in elevation from 1 to 5 feet above the grade of the adjacent wetlands. Two rail lines and Kitts

Highway define the western boundary of IRP Site 5. The rail lines and Kitts Highway are elevated approximately 4 to 5 feet above the salt marsh to prevent tidal inundation. The overall topography of IRP Site 5 consisted of an elevated fill area, which extended from the elevated railroad tracks and Kitts Highway eastward into the SBNWR (Figure 2-1). The fill area at IRP Site 5 was identified during the RSE as containing both disposal fill and construction fill. The disposal fill was determined to contain varying amounts of asphalt and concrete rubble, rusted metal fragments, broken glass, concrete fragments, trash, ordnance items, and other miscellaneous debris to a depth of up to 5 feet below ground surface (bgs). The construction fill was determined to contain only trace amounts of man-made materials, did not appear to contain any ordnance items, and seemed to be related to the construction of the rail lines and Kitts Highway along the western portion of the site (BNI, 2001b). No chemicals of potential concern (COPCs) were previously reported for IRP Site 5.

2.3 PAST HISTORY OF OPERATIONS AND ACTIVITIES AT THE SITE

IRP Site 5 was initially used in 1944 as a disposal area for construction debris and clean fill during the construction of NAVWPNSTA Seal Beach. A review of aerial photographs performed during a previous investigation indicated that earthwork activities at the site, possibly related to disposal activities, had been conducted prior to November 1952 (BNI, 2001b). Aerial photographs taken between 1952 and 1981 show changes in the extent of vegetation at the site, the locations of unpaved roads both on and leading to the site, and the ground surface of the site, suggesting that filling or disposal activities were conducted during these years. Ordnance items were reportedly found at the site, and trucks were observed in the past off-loading ordnance-related material such as shell casings mixed with construction debris (NEESA, 1990).

Few changes were observed at IRP Site 5 from 1981 to 1995, suggesting that the disposal activities, if any, were minimal. Aerial photographs from 1995 to 1998 show similarities in the appearance and extent of the disposal area, suggesting that the disposal activities, if any, were insignificant.

2.4 GEOLOGIC AND HYDROGEOLOGIC SETTING

NAVWPNSTA Seal Beach is bordered to the southwest by Anaheim Bay and to the north, east, and west by highly developed urban communities. Most of NAVWPNSTA Seal Beach lies on relatively flat alluvial deposits that slope evenly from approximately 20 feet above sea level in the northeast part of the facility to sea level in the tidal salt marsh of the SBNWR in the southwest. The most pronounced topographic feature on NAVWPNSTA Seal Beach is Landing Hill on the western portion of the facility. Landing Hill is uplifted along the northwest-trending Newport-Inglewood Fault Zone that underlies the southwestern half of NAVWPNSTA Seal Beach and covers an area extending west of NAVWPNSTA Seal Beach across Seal Beach Boulevard. Landing Hills reaches a maximum elevation of about 50 feet above mean sea level on NAVWPNSTA Seal Beach (JEG, 1995a).

The subsurface lithology at IRP Site 5 consisted of disposal fill and construction fill composed of silts and sands with varying amounts of man-made materials to a depth of approximately 5 feet bgs. Beneath the fills, intervals of alternating clays, silts, clayey silt, and silty sands are present to a maximum depth of 30 feet bgs. These intervals are underlain by a sandier interval of unknown thickness. The alternating intervals of clays, silts, clayey silt, and silty sands become thicker toward the east and thinner along the southern portion of the site (BNI, 2001a).

The tidal influence survey conducted as part of the RSE (BNI, 2001b) reported the elevation of groundwater beneath IRP Site 5 to be 1.28 feet above mean sea level. Results of the tidal influence survey show that the shallow groundwater gradient tends toward the east-northeast at a relatively flat gradient of 0.0001. Groundwater quality parameters measured in the laboratory and in the field indicate that the groundwater beneath the site is brackish on the west-northwest side of the site and becomes more saline toward the east.

3.0 MAIN PHASES LEADING TO REMOVAL ACTION

This section summarizes field data from previous investigations and includes a brief description of the nature and extent of contamination along with a brief discussion of the risk to human health and the environment. The nature and extent of contamination at IRP Site 5 is described in the Final EE/CA (BNI, 2001a) based on the results of previous investigations. This section also describes the RAOs and the recommended removal action presented in the Final EE/CA (BNI, 2001a).

3.1 PREVIOUS ACTIONS

There has been no previous removal action taken at IRP Site 5.

3.2 PREVIOUS INVESTIGATIONS

NAVWPNSTA Seal Beach and the DON have been actively engaged in the IRP since 1980. The following sections summarize the results of previous environmental investigations conducted at IRP Site 5.

3.2.1 Initial Assessment Study

In 1985, the DON conducted an IAS to investigate potentially contaminated sites at NAVWPNSTA Seal Beach (NEESA, 1985). Twenty-five potentially impacted sites at NAVWPNSTA Seal Beach were identified based on record searches, aerial photographs, field inspections, and interviews with NAVWPNSTA Seal Beach personnel. The IAS Report recommended no further action at IRP Site 5 because it concluded that the site does not pose a potential threat to human health or the environment and because no evidence of hazardous waste disposal was found or reported (NEESA, 1985).

3.2.2 RCRA Facility Assessment

In 1989, United States Environmental Protection Agency (EPA) performed a RCRA Facility Assessment (RFA) of NAVWPNSTA Seal Beach. Based on historical information, interviews with NAVWPNSTA Seal Beach personnel, and visual inspections of the sites, the RFA concluded that the current and ongoing potential for release to subsurface media for IRP Site 5 was low (AT Kearney, Inc., 1989).

3.2.3 Preliminary Assessment (Addendum To IAS)

In response to concerns expressed by DTSC in August 1990, a Preliminary Assessment was conducted as an addendum to the IAS for NAVWPNSTA Seal Beach (NEESA, 1990). This addendum described re-evaluation of sites recommended for no further action in the IAS Report (NEESA, 1985). The Preliminary Assessment recommended that the southern part of IRP Site 5

be further investigated under the DON IRP because of the possible presence of explosive wastes (NEESA, 1990).

3.2.4 Site Inspection

In August 1990, during a site visit conducted by JEG, some evidence of munitions was found, but no evidence of live ammunition was found (JEG, 1995b). The site was recommended for further investigation because it is adjacent to wetlands and is located within the SBNWR.

As part of the Site Inspection pre-sampling activities, the DON explosive ordnance demolition team conducted a visual survey of the site. The survey revealed heavy concentrations of construction debris and eight expended/empty 20- and 40-mm shell casings. The Site Inspection Report (JEG, 1995b) states that "corporate knowledge of the site indicates [that] no live ordnance dumping has been conducted in the last 17 years and the probability of contacting live ordnance is considered remote, but cannot be ruled out."

Based on analytical results of soil and groundwater samples, no volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), or polychlorinated biphenyls (PCBs) were determined to be COPCs.

Chromium, copper, lead, mercury, nickel, and zinc were reported above the station-wide upper limit background values (ULBVs) in soil for these metals, as determined in the Station-wide Background Study Report (JEG, 1995c). Lead concentrations were also reported above the residential Preliminary Remediation Goal (PRG) value. Based on the results of the Site Inspection, a Focused Site Inspection (FSI) was recommended to conduct further confirmation soil sampling, assess the shallow groundwater gradient, and evaluate potential migration pathways.

3.2.5 Focused Site Inspection

The FSI (JEG, 1996) indicated elevated lead concentrations in soil samples collected from the northeast end of IRP Site 5. Based on the FSI results, it was concluded that impact of IRP Site 5 chemicals on human health and the SBNWR was minimal. Therefore, no removal action was recommended. Rather, it was recommended that an administrative measure be taken to inform workers of the potential presence of buried ordnance and elevated lead concentrations at the site and to prohibit personnel from entering the site. It was also recommended that an ecological assessment be conducted (JEG, 1996).

3.2.6 Ecological Assessment

In 1997, an Ecological Assessment was conducted to evaluate possible ecological effects of residues from past materials handling and disposal practices for the Operable Unit 4 and 5 sites.

Results showed that risks to ecological receptors from exposure to IRP Site 5 soils were minimal. It was recommended that habitat restoration include capping the site with clean fill (JEG, 1997).

3.2.7 Removal Site Evaluation

Based on the findings of investigations conducted prior to the RSE, the chemicals that were reported at IRP Site 5 did not pose a significant risk to either human health or the environment. However, the pre-RSE investigations were limited to sampling around the perimeter of the disposal area to avoid the potential hazard from ordnance items.

In 1998, the RSE was conducted to determine contaminant levels within the disposal area soils, the salt marsh, and groundwater at IRP Site 5. The RSE included the collection of soil, sediment, and groundwater samples from within the perimeter of the fill area. A radiological walkover survey and UXO survey were also conducted as part of the RSE.

As part of the RSE, soil samples (from the disposal area), sediment samples (from the salt marsh area), and groundwater samples were collected and analyzed for nitroaromatics and nitramines (explosives), SVOCs, polynuclear aromatic hydrocarbons (PAHs), PCBs, and target analyte list metals. In addition, soil and groundwater samples were analyzed for VOCs and hexavalent chromium.

VOCs reported in IRP Site 5 soil were present at concentrations lower than the industrial PRGs (EPA, 1998). Eight target analyte listed (TAL) metals (antimony, arsenic, cadmium, chromium, cobalt, copper, lead, and zinc) and hexavalent chromium were reported above statistical background levels in the soils from the disposal area.

In addition, a radiological walkover survey of IRP Site 5 was conducted during the RSE. Results of the radiological walkover survey indicated that radiation levels within the disposal area were well within the background range (for example, levels in areas surrounding the disposal area). A statistical comparison of the data indicated that the background population was the same as the IRP Site 5 population.

A UXO survey of the site was also conducted as part of the RSE. The UXO survey results indicated the presence of OE items and scrap metal at ground surface and below ground surface within the disposal fill. The UXO survey concluded that additional magnetic anomalies exist at IRP Site 5 and that ordnance items, and the potential associated hazards, may still be present in the subsurface fill.

The UXO survey documented OE and OE-related waste disseminated throughout the disposal fill at a relatively low frequency of occurrence and that further subsurface investigation was warranted to remove the potential hazard associated with OE items. The types and quantities of OE items reportedly (BNI, 2001b) recovered from IRP Site 5 included:

- One 40-mm projectile cartridge case (with potentially live primer)
- Four 40-mm projectile casings (with potentially live primer and smokeless powder residue)
- Two 20-mm high-explosive projectiles (complete round)
- One 20-mm projectile (corroded)
- Five 20-mm cartridge casings (with potentially live primers)
- Two 5-inch projectile fuses (unknown type)
- Two .50-caliber cartridges (ball round type)
- Six .50-caliber cartridge casings (with potentially live primers)
- One .30-caliber cartridge (ball round type)
- Four projectile flash tubes (smokeless powder residue)
- Eleven pounds of OE waste/scrap
  (for example, inert 40-mm, 20-mm, and .50-caliber cases)

Additionally, it was determined that OE items as large as 8-inch projectiles had been produced at NAVWPNSTA Seal Beach and, therefore, the potential exists for their presence in the disposal fill.

3.3 RISKS TO HUMAN HEALTH AND/OR THE ENVIRONMENT

Based on the results of the RSE investigations, both a human health risk assessment and an ecological risk assessment were conducted. Human health risk assessment results indicated that total and incremental excess lifetime cancer risk (ELCR) for a United States Fish and Wildlife Service (USFWS) restoration/maintenance supervisor and tour guide exposed to soils and VOCs originating from the groundwater were estimated to be within the NCP target risk range for health protectiveness. The hazard index for a USFWS habitat restoration/maintenance supervisor and tour guide exposed to soils at the site was reported to be less than 1.0, indicating unlikelihood of systemic toxicity. Additionally, results of the ecological risk assessment indicated that the potential for ecological risk at IRP Site 5 appeared to be low.

Based on the results of the risk evaluation conducted as part of the RSE, the Final RSE Report (BNI, 2001b) recommended no further action for soils, sediment, or groundwater at IRP Site 5. As a result, there were no COPCs for soils, sediment, or groundwater at IRP Site 5. However, because the UXO survey indicated that the potential hazard associated with OE items may still exist at the site, the RSE recommended that the site be further evaluated for OE items.

As part of the Final EE/CA (BNI, 2001a), a qualitative risk evaluation was performed based on the hazards to human health and the environment associated with the OE items at IRP Site 5. The qualitative risk evaluation was performed using procedures provided in Appendix B of the *Risk*

Assessment Procedures for Ordnance and Explosives Sites Manual [United States Army Corps of Engineers (USACE), 2000], whereby hazard severity and hazard probability were assigned based on a numerical rating. Details on the risk assessment are included in the Final EE/CA (BNI, 2001a). The hazard severity was evaluated using a rating system with severity levels consisting of (from lowest to highest) "none", "negligible", "marginal", "critical", and "catastrophic", based on a qualitative measure of the worst credible event resulting from personnel exposure to various types and quantities of OE (USACE, 2000). Based on the area, extent, and accessibility of the ordnance hazard, the hazard probability value was applied using a rating system with probability levels consisting of (from lowest to highest) "improbable", "remote", "occasional", "probable", and "frequent." The resulting hazard severity for IRP Site 5 was rated as "critical", while the hazard probability was rated as "probable." Based on these ratings, the risk evaluation findings indicated that further action is warranted with respect to the suspected remaining OE items at IRP Site 5.

3.4 EXPOSURE PATHWAYS AND SENSITIVE POPULATIONS

Based on the Final EE/CA (BNI, 2001a), workers conducting intrusive activities and/or removal activities at IRP Site 5 would be at greatest risk. In addition, non-human organisms that lived on or otherwise used IRP Site 5 might be impacted if an explosion occurs or if any response activity took place to address OE items present at the site.

Because wildlife refuges are established to protect wildlife, human presence on refuges is usually limited to regulatory agency (for example, USFWS) personnel, scientists from academic institutions, and brief visits by the general public. Therefore, human exposure to OE items at IRP Site 5 would be limited.

Of the five species of birds that are listed as endangered by either federal or state agencies and are known to occur at NAVWPNSTA Seal Beach and the associated wetlands, the state-listed Belding's savannah sparrow is thought to potentially occur in the upland area of IRP Site 5.

3.5 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The NCP requires on-site CERCLA removal actions to identify and comply with federal and state ARARs to the extent feasible, considering the urgency of the situation. In accordance with the NCP requirements, the ARARs for the NTCRA at IRP Site 5 were identified and documented in the Final EE/CA (BNI, 2001a). Several chemical-specific, location-specific, and action-specific ARARs were identified that affected the development of RAOs for IRP Site 5. The ARARs for the NTCRA at IRP Site 5 consisted of the following:

- The substantive requirements of the Military Munitions Rule at 40 Code of Federal Regulations (CFR), Part 266, Subpart M. This rule identifies requirements for the identification of hazardous waste munitions and treatment and storage requirements for hazardous waste munitions. Military munitions must be managed in accordance

with 40 CFR, Part 266, Subpart M requirements, unless the waste meets the criteria set forth in 40 CFR, Part 266.205(a)(1)(i)-(vii).

- The RCRA requirements at 22 California Code of Regulations (CCR), Sections 66261.22(a)(3) and (4), 66261.101, 66261.3(a)(2)(C), and 66261.3(a)(2)(F), which define non-RCRA hazardous waste.
- State requirements regarding the definitions of "designated waste", "non-hazardous waste", and "inert waste" in 27 CCR, Sections 20210, 20220, and 20230.
- South Coast Air Quality Management District (SCAQMD) Rule 401 (b)(1)(A), which regulates discharge to air.
- EO 11988, Protection of Floodplains at 40 CFR, Part 6.302, Appendix A, excluding Sections 6(a)(2), 6(a)(4), and 6(a)(6), and EO 11990, Protection of Wetlands at 40 CFR, Part 6, Appendix A, excluding Sections 6(a)(2), 6(a)(4), and 6(a)(6).
- The substantive National Wildlife Refuge System requirements at 50 CFR, Parts 27.21 and 27.94.
- The substantive requirements of the Migratory Bird Treaty Act of 1972 in 16 United States Code (USC), Section 703.
- The substantive Endangered Species Act requirements at 16 USC 1536(a), (h)(l)(B).
- Fish and Game Code, Section 1908, regarding rare or endangered native plant habitats, and Fish and Game Code, Section 2080.
- The RCRA requirements at 22 CCR, Sections 66262.10(a), 66262.11, 66264.13(a) and (b), and 66262.34, which delineate the RCRA hazardous waste requirements associated with identification of hazardous waste generation and on-site accumulation.
- The substantive portions of the staging pile requirements at 40 CFR, Part 264.554. These requirements allow generators to accumulate solid remediation waste in an EPA-designated pile for storage only, for up to 2 years, during remedial operations without triggering land disposal restrictions.
- Requirements at 22 CCR, Section 66265.382, and Title 22, CCR, Division 4.5, Chapter 16, Article 16, regarding the open burning and open detonation of waste explosives.
- Substantive waste discharge requirements of 27 CCR, Section 20410, and 27 CCR, Section 20415.
- The California definitions of "designated waste," "non-hazardous waste," and "inert waste" in 27 CCR, Sections 20210, 20220, and 20230.

3.6 REMOVAL ACTION OBJECTIVES

The primary objective of the NTCRA at IRP Site 5 was to protect human health and the environment. RAOs were developed to define and evaluate removal action alternatives. Potential ARARs were identified and evaluated to assist in determining RAOs.

According to the NCP, eight factors must be considered to determine the appropriateness of a removal action [40 CFR 300.415(b)(2)]. Of the eight NCP criteria for determining the appropriateness of a removal action, those identified as applicable for this NTCRA are:

- Threat of fire or explosion
- Availability of other appropriate federal or state response mechanisms to respond to the release

The RAOs were developed based on statutory explosives safety and environmental response authorities in the Defense Environmental Restoration Program, 10 USC 172, and CERCLA to address the risks posed by OE items, risk evaluation results, and ARARs. The RAOs are as follows.

- Reduce the risk from potential OE items to humans to the extent practicable in a manner that also minimizes the safety risks to response specialists, is cost effective, and complies with all ARARs.
- Minimize impact to and preserve existing beneficial uses of the SBNWR.

3.7 IDENTIFICATION AND SELECTION OF REMOVAL ACTION ALTERNATIVES

Four alternatives were identified and evaluated for overall effectiveness in achieving the RAOs, technical and administrative feasibility, and cost effectiveness. The four alternatives consist of no action, engineering/institutional controls, limited removal with engineering/institutional controls, and complete removal.

Following the completion of the detailed evaluation, the alternative recommended by the DON in the Final EE/CA (BNI, 2001a) was complete removal of all OE items and construction demolition debris, including concrete and asphalt rubble. This alternative was selected because of its greater effectiveness in reducing risks to humans and the environment through complete removal of on-site OE items and restoring the site for unrestricted land use.

4.0 REMOVAL ACTIVITIES

This section provides a detailed description of the specific field activities performed during the removal of the disposal/fill area at IRP Site 5. These activities followed the planned procedures discussed in the Final Project Work Plan (FWENC, 2001a) that was reviewed and approved by the DON, DTSC, and the RWQCB, with certain exceptions and deviations from what was originally stated. These changes were for the most part an enhancement to the original planned procedures or actions. The changes are described and listed in detail in Section 4.22 of this report. The field activities for this project commenced on September 17, 2001, and were completed on April 16, 2002.

Under the direction of the DON, FWENC was responsible for performing and supervising the fieldwork, project management, quality control (QC), health and safety, and reporting of results. Field activities including geophysical/OE surveying, excavation, soil screening, OE identification and certification, and grading were performed and supervised by trained FWENC construction personnel and FWENC UXO specialists.

FWENC was also responsible for directly coordinating and supervising the activities of the subcontractors.

The work and activities performed are described in Subsections 4.1 through 4.21 of this report.

4.1 SUBCONTRACTING/PROCUREMENT

All field activities were performed under the direct supervision of FWENC with assistance from several specialty subcontractors. The procurement of subcontractors, as well as leasing of the required equipment and necessary materials, was performed in a manner consistent with the terms of the contract and the applicable Federal Acquisition Regulations.

Several specialty subcontractors were procured to assist in specific aspects of the NTCRA activities. These subcontractors included a civil surveying contractor; hazardous waste hauler/transporter; treatment, storage, and disposal facility; drilling contractor; and two analytical laboratories.

FWENC conducted earthmoving activities including soil excavation, temporary stockpiling of the excavated material, and backfilling and restoring the site. The hazardous waste hauler/transporter was Waste-By-Rail (WBR) (Newport Beach, California), which was responsible for the transportation of the impacted soils and waste material to the East Carbon Development Corporation (ECDC) disposal facility located in East Carbon, Utah. BC2 Environmental of Fullerton, California, was retained as drilling contractor to conduct well abandonment.

Applied P & CH Laboratory (APCL) located in Chino, California, performed all of the required chemical analyses on the soil samples for waste characterization, verification, and disposal classification. APCL also performed liquid analyses on liquid waste contained in a drum discovered during the removal activities. Health Science Associate Laboratory Services located in Los Alamitos, California, performed laboratory analysis for particulate matter and lead in samples collected from personnel sampling instruments.

Coast Surveying Corporation, of Tustin, California, was responsible for land surveying. Shepherd Machinery Co., Hertz Equipment Rental, and Hawthorne Equipment provided construction equipment rental. Equipment operators, specialists, and laborers were hired on an as-needed basis through the local labor union. Vendor procurement involved leasing an office trailer, portable sanitary facilities, and health and safety monitoring equipment. Other miscellaneous equipment, such as sampling and testing equipment, construction tools, polyethylene liners, sandbags, and so forth, were procured on an as-needed basis.

4.2 KICKOFF MEETING

A kickoff meeting was held on September 6, 2001. The purpose of this meeting was to develop a mutual understanding of the work to be performed, the contractor quality control (CQC) details including forms to be used, administration of on-site work, and coordination of the construction management. Attendees included Mr. Si Le [DON Remedial Project Manager (RPM)], Ms. Pei-Fen Tamashiro [NAVWPNSTA Seal Beach Installation Restoration (IR) Program Manager], Mr. David Crawley [NAVWPNSTA Seal Beach Resident Officer in Charge of Construction (ROICC)], Mr. Mike Delaney [NAVWPNSTA Seal Beach Explosive Safety Officer (ESO)], Mr. Hamlet Hamparsumian (FWENC Project Manager), Mr. Glenn Nardin (FWENC Project Superintendent), Mr. Wendell Morgan (FWENC UXO QC Manager), and Mr. Melvin Young [FWENC Senior UXO Supervisor (SUXOS)].

4.3 NOTIFICATIONS

Prior to mobilizing equipment and personnel to IRP Site 5, Underground Service Alert was notified to obtain utility clearance for excavation. FWENC also notified the County of Orange Health Care Agency of the planned well abandonment activities.

Prior to the removal activities, FWENC notified the ROICC and the appropriate NAVWPNSTA departments or personnel about the nature of the anticipated work. During the course of site work at IRP Site 5, it was necessary to obtain several Hot Work permits from the NAVWPNSTA Seal Beach Fire Department for the purpose of cutting and welding activities at IRP Site 5.

FWENC also coordinated closely with Dr. John Bradley, USFWS representative and SBNWR Manager, for both initial entry into the refuge and entry during the course of the project. SBNWR is an essential part of the Pacific Flyway bird migration route and includes habitat for

five endangered bird species: the light-footed clapper rail, Belding's savannah sparrow, California brown pelican, California least tern, and American peregrine falcon. These species inhabit, nest, and/or forage in the pickleweed stands, saltwater ponds, and open sandy areas of the salt marsh. Dr. Bradley performed visual monitoring for the presence of endangered bird species both prior to and during the course of the project. Dr. Bradley also used an electronic sound level meter to monitor decibel levels to ensure that the construction noise emanating from the site was not at unacceptable levels that would disturb any possible nesting activity.

4.4 PROJECT MOBILIZATION/TRAINING

Mobilization activities for IRP Site 5 commenced on September 17, 2001. Mobilization included a project trailer, connection of trailer utilities (electricity and phone) by NAVWPNSTA Seal Beach public works, mobilization of a lockable shipping container for tool and equipment storage, mobilization of two portable toilets, and fence installation. In order to facilitate site security and to discourage pedestrian traffic through the site, a 6-foot-high chain-link fence with silt screen was installed along the western and northern site boundaries. The eastern and southern boundaries of the site were within SBNWR and fencing was not practical. Two 24-foot-wide gates were installed along Bolsa Avenue to allow site access for construction equipment and to prevent unwanted vehicular access during non-work hours.

At the outset of the project and before any individual was allowed to work at the site, a site-specific training session was conducted by the FWENC SUXOS, FWENC UXO QC/Safety Officer, and the FWENC Construction QC/Safety Officer. As part of the site-specific training, the above individuals had reviewed the Work Plan and the appendices of the Work Plan including the Standard Operating Procedures (SOPs). Following the review of the Work Plan and the SOPs, the field supervisors and the field team members signed the appropriate review sheets attached to the SOPs and the Final Site-Specific Health and Safety Plan (FWENC, 2001b), acknowledging that they had read and understood them. The training was also attended by all personnel assigned to work at the site. The purpose of the training was to familiarize site personnel with the hazards of OE-related work and how to perform daily activities in a safe manner. This information was reiterated on a daily basis during a health and safety briefing held at the outset of each workday. The daily health and safety briefing covered both OE- and construction-related safety issues. The FWENC SUXOS (Mr. Melvin Young), the FWENC UXO QC/Safety Officer (Mr. Morris Reed), and the FWENC Construction QC/Safety Officer (Mr. Carl Jones) were responsible for health and safety oversight and were on site at all times during performance of the work.

4.4.1 UXO Quality Control Test Bed

Mobilization activities also included the construction of a UXO QC test bed. The function of the test bed was to ensure that the geophysical survey equipment used for the detection of subsurface

metallic objects (for example, items requiring investigation for the possibility of being OE or OE-related) at IRP Site 5 was functioning properly.

The geophysical survey equipment used for the detection of subsurface metallic objects at IRP Site 5 included the following:

- Leica differential global positioning system (DGPS) in conjunction with an EM-61 electromagnetic induction sensor and data recording device – used to locate magnetic signatures associated with subsurface metallic objects (ferrous and non-ferrous) and record the associated data (northing coordinate, easting coordinate, magnetic intensity, size, and depth). The EM-61 equipment requires a two-specialist crew and is manipulated over an area by walking in a slow, methodical pattern. The data is then uploaded to a computer for evaluation by the specialist. The magnetic intensity of each signature is quantified in millivolts. The magnetic anomalies are then represented on the computer's screen, differentiated by color. Each specified millivolt range is assigned a unique color and shade. The detection depth for the EM-61 is typically 6 feet bgs.
- Schonestedt metal detector – used to locate magnetic signatures associated with subsurface metallic objects (ferrous metals only). This is a hand-held device that produces a tone that is audible to the specialist. The pitch of the tone corresponds to the magnetic intensity of the metallic object. At IRP Site 5, this device was quite sensitive to background "noise", such as rust and/or small particles of metal present in the soil, making it difficult for the operating specialist to locate and isolate metallic objects large enough to be OE or OE-related. The detection depth for the Schonestedt is typically 18 inches bgs.
- White's spectrum XLT metal detector - used to locate magnetic signatures associated with subsurface metallic objects (ferrous and non-ferrous). This is a hand-held device that produces a tone that is audible to the specialist. The pitch of the tone corresponds to the magnetic intensity of the metallic object. For IRP Site 5, the White's spectrum XLT was more effective than the Schonestedt due to its ability to detect a wider range of metals (for example, aluminum, brass, copper, and so forth) and because it was less sensitive to background "noise". The detection depth for White's spectrum XLT is typically 18 inches bgs.

The UXO QC test bed was 42-feet-long by 28-feet-wide, and located due west of Building 241 at former IRP Site 19. The test bed was comprised of 32 metallic objects. The objects were divided into four rows of seven and one row of four. The objects within each row and the rows themselves were spaced 7 feet apart. Twenty-eight of the objects were 6-inches-long x 3/4-inch-diameter steel pipe nipples intended to resemble 20-mm round. Four of the objects were 18-inches-long by 2-inch-diameter steel pipe segments intended to resemble 40-mm rounds. According to the QC requirements, all of the objects were buried at various depths up to 17 inches bgs and at various orientations (vertically, horizontally north-south, or horizontally east-west). The depth and orientation of each object was noted for later comparison with the geophysical survey equipment test results.

All geophysical survey equipment (Leica/EM-61, Schonestedt, and White's Spectrum XLT) utilized by the geophysical investigation team was tested at the test bed. In accordance with the SOP for Geophysical Surveying (SOP-1) in the Appendix C of the Work Plan (FWENC, 2001a), the equipment responses to the known depths and orientation of the buried metallic test pipes were deemed accurate by the FWENC SUXOS and FWENC UXO QC/Safety Officer. Each team member properly demonstrated the ability to perform his assigned tasks while using the equipment at the equipment test bed.

4.5 INITIAL OE SURVEY/SURFACE CLEARANCE

Prior to clearing the vegetation at IRP Site 5 in preparation for the pre-excavation geophysical survey, an initial OE survey/surface clearance was performed to identify metallic objects at the surface and/or partially buried below the surface. The purpose of the work was twofold: 1) to remove potentially hazardous items to mitigate risk for vegetation-clearing operations and 2) to remove metallic items on the surface of the disposal/fill area that could create magnetic interference during the pre-excavation geophysical survey. The initial OE survey/surface clearance was performed using trained FWENC UXO specialists under the supervision of the FWENC SUXOS and FWENC UXO QC/Safety Officer. All procedures were performed in accordance with SOP-1 and SOP-2, SOPs for Surface Clearance Operations, and OE/UXO Intrusive Sampling, Handling, Transportation, and Storage of OE/UXO, respectively in the Appendix C of the Work Plan (FWENC, 2001a).

Two FWENC UXO specialists performed the work by first delineating two adjacent 5-foot-wide and 100-foot-long lanes in the disposal/fill area using highly visible, colored rope. Each of the FWENC UXO specialists then methodically walked the length of a lane, using both visual inspection and a Schonestedt metal detector. OE-related items that were encountered were removed from the area and placed into a 55-gallon drum pending transfer to the designated NAVWPNSTA Seal Beach storage facility (Section 4.10). OE that was encountered was first examined by the SUXOS and determined to be safe to move. OE items were placed into a separate container pending transfer to the designated NAVWPNSTA Seal Beach storage facility. When the UXO personnel had completed walking the two lanes, the rope was moved over and two new 5-foot-wide and 100-foot-long lanes were created. This process was repeated until the entire surface of the disposal/fill area was cleared.

4.6 MONITORING WELL ABANDONMENT

On September 17, 2001, the two groundwater monitoring wells (identified as 05-MW-01 and 05-MW-02 in Figure 2-1) at IRP Site 5 were abandoned. The wells were abandoned by BC2 Environmental (located in Fullerton, California), a state of California-licensed subcontractor, under the direction of FWENC personnel. A FWENC UXO specialist was present during the well abandonment to perform safety oversight for UXO-related issues.

The wells were destroyed in a manner consistent with the County of Orange Health Care Agency well abandonment requirements and specifications outlined by the California Department of Water Resources (DWR) (DWR, 1991). The procedures for abandoning each well were as follows:

- The depth of the monitoring wells were measured using a water level sounder in order to determine the required depth for over-drilling and to estimate the amount of sealing material required. Both wells were 17 feet deep.
- The well monuments and well heads were removed prior to over-drilling each well. The well monuments and well heads were hauled off site for disposal along with the debris from IRP Site 5 removal operations.
- The entire well casing was removed from each well using the drill rig's hydraulic system to pull the casings out vertically. The well casings were removed in one piece, including the screened interval located at the bottom. Both casings (including the screened interval) were 17 feet long.
- Each well was over-drilled to a depth of 20 feet bgs (3 feet past the bottom of the well) using a 10-inch-diameter hollow-stem auger.
- Following completion of over-drilling, each borehole was backfilled with a mixture of bentonite and cement slurry. Eleven cubic feet of backfill material were used for each borehole.
- To prevent bridging during backfilling, the sealing material was placed with the use of a tremie pipe, proceeding upward from the bottom of the borehole. The sealing material was placed in one continuous operation (or "pour") and allowed sufficient time to settle.
- After settling, bentonite pellets were added to top of the borehole and hydrated with water.
- The soil cuttings, resulting from over-drilling each well, were placed into United States Department of Transportation (DOT)-approved 55-gallon drums pending off-site disposal. This material was later shipped off site via railcar to the ECDC disposal facility in East Carbon, Utah, for disposal (Section 4.16.4).
- The auger flights were steam-cleaned prior to and after over-drilling each well. Auger decontamination was performed with a self-contained decontamination trailer. Decontamination wastewater was collected into DOT-approved 55-gallon drums pending off-site disposal.

4.7 TOPOGRAPHIC SURVEY

On September 18, 2001, a topographic survey was performed at IRP Site 5 by Coast Surveying Inc., located in Tustin, California, a state of California-licensed subcontractor, under the direction of FWENC. The purpose of the survey was to document the pre-excavation elevations across the site and to divide the excavation area into 25 contiguous grid cells, each 100 feet

square. A FWENC UXO specialist was present during the topographic survey to perform safety oversight for UXO-related issues.

The "origin" for the network of grid cells was located approximately 50 feet due south of the intersection of Kitts Highway and Bolsa Avenue. The approximate north-south axis of the grid network paralleled the railroad tracks adjacent to the west side of IRP Site 5. The approximate west-east axis of the grid network was laid out perpendicular to the north-south axis. The north-south axis was divided into eight 100-foot sections, designated from the origin as 1 through 8, respectively. The west-east axis was divided into four 100-foot sections, designated from the origin as A, B, C, and D, respectively. The grid cells were used as reference points for the pre- and post-excavation geophysical surveys, and during excavation and soil sampling activities. The coordinates used were based on California State Plane Coordinates, Zone 6. The datum was North American Datum (NAD) 83. The results of the survey and a pre-excavation topographic map of the site are shown in Figure 2-1.

4.8 VEGETATION CLEARING AND GRUBBING

Once the UXO specialists had completed the initial OE survey/surface clearance, vegetation clearing and grubbing commenced. Two laborers utilized mechanical, walk-behind brush hogs to clear surface vegetation to within 4 inches from ground surface. This hand clearing activity was performed on September 19 and 20, 2001, to facilitate the pre-excavation geophysical survey (Section 4.9). Once the pre-excavation geophysical survey was completed, a Caterpillar® (CAT) 963 track loader, a CAT 426 backhoe, and a 5-yard dump truck were utilized to remove the surface debris and to cut the remaining surface vegetation to the bottom of its root system. A FWENC UXO specialist was present to perform safety oversight for UXO-related issues. Clearing and grubbing was completed on October 2, 2001.

Surface debris consisted of large wooden poles and remnants of decomposed railroad ties, miscellaneous metal debris (cables, pipes, angle iron, and so forth) and pieces of concrete. Large quantities (approximately 700 cubic yards) of concrete debris were present in piles located beyond the southern limits of the excavation in Grid Cells A-5, A-6, and B-5. This concrete was consolidated into one pile in Grid Cell A-5, and was later transferred to IRP Site 7 for crushing. All other (non-concrete) debris, totaling approximately 150 cubic yards, was staged in Grid Cell A-2. Prior to transportation off site, each pile was spread out and visually inspected for OE and OE-related material by UXO specialists. This material was later transported via Union Pacific Railroad (through ECDC of Newport Beach, California) to ECDC's disposal facility in Utah.

The vegetation removed from the site consisted of a native wetland species with a dense root system, iceplant, and four palm trees. The native wetland species were found mainly in lower elevation areas in Grid Cells C-6, C-7, D-6, and D-7. The remainder of the site was either bare or covered with ice plant. The native wetland species and iceplant were cleared using both a CAT 426 backhoe and a CAT 963 track loader. The palm trees, located toward the northern limits of

the disposal/fill area, were removed using a CAT 963 track loader. The native wetland species and iceplant were stockpiled separately in Grid Cell A-6. Each stockpile consisted of approximately 250 cubic yards. Prior to transportation off site, each stockpile was spread out in a 6-inch-thick layer over an area that was previously cleared of all magnetic anomalies. This material was then visually inspected and tested by UXO specialists using the White's spectrum XLT metal detector. All magnetic anomalies encountered were investigated for the possibility of being OE or OE-related items. This vegetation was later transported by rail to ECDC's disposal facility in Utah.

4.9 PRE-EXCAVATION GEOPHYSICAL SURVEY

Prior to performing excavation of the disposal/fill area, a geophysical survey was performed on October 24, 2001. The purpose of the survey was to locate and record the position (northing coordinate, easting coordinate, and depth) of subsurface magnetic anomalies associated with buried metallic objects. This information was used to document pre-existing conditions at the site and to facilitate the excavation of grid cells containing larger-sized and/or highly concentrated numbers of anomalies.

The Leica DGPS, in conjunction with an EM-61 electromagnetic induction sensor and data recording device, was used during the survey. Prior to use at IRP Site 5, the EM-61 equipment was calibrated using the known depths and orientations of the buried metallic objects located at the UXO QC test bed.

The FWENC personnel responsible for performing the geophysical surveying at IRP Site 5 were trained and experienced users of the EM-61 equipment and were experienced in the downloading and QC of data. Survey methodology, data requirements, field note protocol, and transect deviation documentation were performed in accordance with SOP-1, Standard Operating Procedures for Geophysical Surveying in the Appendix C of the Work Plan (FWENC, 2001a).

The results of the pre-excavation geophysical survey are shown in Figure 4-1. The pre-excavation geophysical survey results indicated that virtually the entire fill area contained magnetic anomalies associated with buried metallic objects [the pink areas in Figure 4-1 indicate areas that contained the greatest concentration of metal, followed by fuchsia, red, orange, yellow, and green (no metal)]. The concentration of buried metal was so high that the number of individual anomalies could not be quantified.

4.10 EXCAVATION OF DISPOSAL/FILL AREA

Excavation of the disposal/fill area began on October 3, 2001. Excavation of the disposal/fill area was performed by FWENC utilizing union craft labor under the supervision of the FWENC construction personnel and the FWENC UXO specialists. The excavation approach was to remove the disposal/fill area by excavating each grid cell in layers in order to minimize the potential for

detonation of any OE items present. After excavation, the soil was processed through a mechanical vibrating screen (Robotrack model manufactured by Extec USA) to remove all objects of size 1/2-inch (12.7-mm) and larger. The objects that could not physically pass through the screen 1/2-inch mesh would then be inspected and verified as not being OE or OE-related items.

At the outset of excavation activities, the potential problem of tidal inundation associated with the adjacent wetlands was addressed. Clearly, if the surface elevation of the disposal/fill area was excavated below the high tide elevation, the site would flood and become unworkable. The problem was resolved by leaving in place a 10-foot-wide section of the soil along the perimeter of the disposal/fill area. All soil contained within the 10-foot-wide section of soil along the perimeter of the disposal/fill area was excavated and screened. This in effect, created a berm, which prevented tidal inundation of the site and kept the soil sufficiently dry to facilitate processing through the mechanical screen. The berm was excavated and screened at the end of the project.

California Occupational Safety and Health Administration and Dig Alert were both notified prior to excavation activities. Dig Alert informed FWENC that to their knowledge no utilities existed within the excavation limits (Dig Alert Control No. 599136). Neither the NAVWPNSTA Seal Beach public works drawings nor the pre-excavation geophysical survey showed any live utilities within the area to be excavated. It was known that a live, 2-inch-diameter water line existed at the site, which terminated at a valve adjacent to the excavation area. An abandoned section of this line traversed into the excavation area. The location of the abandoned section of water line was verified during the pre-excavation geophysical survey and is shown in Figure 4-1. The abandoned water line was later removed during the excavation of the disposal/fill area and discarded with the other debris.

A CAT 330 excavator was initially used to perform the excavation of the disposal/fill area by removing the soil in 6-inch lifts and loading the soil into a 5-yard dump truck for transportation to the screen. The excavation was observed by a UXO specialist using a Schonestedt metal detector. After each pass with the excavator bucket, the UXO specialist would visually examine the excavated area and test the area with the Schonestedt. This methodology was intended to facilitate the removal of larger-sized OE from the spoils and, in the interest of safety, prevent such OE from reaching the screen and being subjected to unnecessary shock. On October 3, 2001, however, when a large-sized piece of OE (60-mm mortar) was encountered coming off of the screen, the excavation methodology was re-examined.

On October 11, 2001, the excavation operation was altered. The excavator was replaced with a CAT D5 dozer and a CAT 950 loader. This change was implemented to provide the UXO personnel with greater visibility of the cut and better opportunity to see larger-sized OE (40-mm and larger) before the soil was fed into the screen. See Appendix A for Field Change Request 1. Additionally, use of the Schonestedt detector (which is capable of detecting ferrous metals only)

was discontinued, and it was replaced with the White's spectrum XLT metal detector (which is capable of detecting ferrous and non-ferrous metals). This change was implemented due to the high content of metal fragments and rust in the soil at IRP Site 5, with the White's spectrum XLT metal detector being much less sensitive to the background "noise". The change further aided the UXO personnel in locating potentially hazardous OE by making it possible to better differentiate between rust and metallic objects.

While the dozer was making a 6-inch-deep cut across a grid cell, producing a windrow of soil (for example, accumulation of spoils) on either side of the cut, a UXO specialist using a White's spectrum XLT metal detector would walk alongside of the dozer and visually observe the spoils being pushed up in front of the blade. At the conclusion of each cut by the dozer, the UXO specialist would then walk the cut area with the metal detector and also check each windrow of soil for OE or OE-related material. After the cut area and windrows were determined to likely be free of OE, the UXO specialist signaled the equipment operators to continue work. The windrows of soil were then moved to the screen using the CAT 950 loader, and the next cut with the dozer ensued.

During/after each pass with the dozer, any OE-related material encountered by the UXO specialist was removed from the cut area. OE items were investigated by the SUXOS and a determination was made as to whether or not the item was safe to move. Items deemed safe to move were removed from the cut area and stored on site in a designated container pending transfer at the end of the workday to the designated NAVWPNSTA Seal Beach storage facility. If an OE item was deemed by the SUXOS as unsafe to move, excavation activities were ceased and DON explosive ordnance disposal (EOD) Mobile Unit 3, Detachment Southwest personnel were notified in order to make a further determination about the object in question.

The top 2 feet of the disposal/fill area consisted mainly of soil and contained a minimal amount of debris. After the excavation had progressed through approximately the first 2 feet of the disposal/fill area, discolored soil was unearthed in Grid Cells B-2 and B-3. The soil was blackish in color and had the appearance of being contaminated. The area of discolored soil was surrounded with "caution" tape and in situ soil samples were collected and submitted for analysis. The sample results indicated elevated concentrations of lead requiring an upgrade in personal protective equipment (PPE) for site personnel during excavation and screening of the soil and segregation of the soil from other stockpiles. Lead concentrations in the two soil samples collected on October 17, 2001, were reported at 1,430 milligrams per kilogram (mg/kg) and 59.1 mg/kg. One of the samples had copper and zinc reported at concentrations of 9,720 mg/kg and 2,700 mg/kg, respectively. The PPE was upgraded to include disposable, chemical-resistant coveralls, chemical-resistant boots, and chemical-resistant gloves. Generally, as the excavation of the disposal/fill area progressed down to the elevation of the surrounding wetlands, the quantities/concentration of trash and debris increased with depth.

Beginning November 6, 2001, a DG5 Komatsu dozer was used due to groundwater present at the lower elevations within the excavation area. The DG5 dozer is designed with wider tracks that exert low ground pressure for use in saturated soil conditions.

Overall, soil removal took place at an average rate of 400 cubic yards per day. Generally, each grid cell was excavated in an 18-inch-thick layer (comprised of three successive 6-inch lifts) before moving to an adjacent grid cell to continue excavation. After all the grid cells were excavated to approximately the same surface elevation, the process was repeated to remove the next 18-inch-thick layer across the disposal/fill area. This process was used until the entire disposal/fill area was removed and native material (for example, soil associated with the wetlands) was encountered. The acquisition of native material (for example, natural grade) in each grid cell was verified both by visual inspection by the FWENC Site Engineer and the UXO specialist's sweep with the White's spectrum XLT metal detector.

After all other areas of disposal/fill were excavated, the soil berm around the perimeter of the site was removed using a CAT 315 excavator and processed through the screen. The berm-removal operation was performed during extreme low tides and completed on March 19, 2002. On March 20, 2002, tidal water began to naturally enter the site. Over the duration of the project, a total of approximately 26,000 cubic yards of soil was excavated from the disposal/fill area at IRP Site 5.

Contractor Production Reports and CQC Reports were filled out for each day that work was performed at IRP Site 5. These forms included information on the work location and description, the respective trades of personnel present on site, hours worked, equipment on site, weather, and a certification by the on-site FWENC CQC Engineer that the work performed was correct, complete, and in compliance with the contract. These forms were submitted to the ROICC for review on a daily basis.

4.10.1 Soil Screening and Stockpiling

As the fill material was being removed in 6-inch layers, a loader would feed the soil into a vibrating, screening machine (Robotrack model manufactured by Extec USA). The top deck of the screen had 6-inch-wide slots and the lower deck consisted of a 1/2-inch by 3-inch, slotted mesh. All soils finer than the 1/2-inch by 3-inch mesh (for example, fines) passed through the screen and were discharged from a conveyor belt. This soil was then considered to be free of OE or OE-related items, since the smallest OE targeted for removal were 20-mm projectiles (20-mm projectiles are larger than the 1/2-inch by 3-inch mesh and therefore, were retained on the screen). The screened soil was stockpiled at the site pending sampling and analysis.

Material larger than the 1/2-inch by 3-inch slotted mesh (for example, oversized material) would vibrate off of the backside of the screen and slide down a steel plate, where a UXO specialist was stationed on a full-time basis to observe and collect OE. A large percentage of the oversized material consisted of moist, clay/silt soil clumps that were large enough to potentially conceal a

20-mm or larger OE item. The oversized soil was, therefore, re-screened with the vibrating deck screen several times. The purpose of re-screening was to reduce the volume of material that required visual inspection and testing for the presence of OE or OE-related items, to collect OE that was previously missed, and to facilitate drying and break up of the clay/silt soil clumps.

As the excavation of the disposal/fill area progressed and more and more debris and moist clay/silt soil clumps were encountered, it became apparent that a change in the screening equipment was necessary. The vibrating deck screen was not designed for use with soil containing large quantities of debris and trash. In order to facilitate the segregation of the fines from the oversized material (clay/silt soil clumps and debris), a rotary Trommel screen with a 3/4-inch mesh drum was used in lieu of the vibrating deck screen. As was the case with the 1/2-inch mesh of the vibrating deck screen, the 3/4-inch mesh was also small enough to prevent a 20-mm projectile from passing through it.

Before being fed into the Trommel by a loader, all unscreened soil/debris was spread out using a CAT D5 dozer and aerated in a thin layer to facilitate drying. First the oversized material generated from the vibrating deck screen was processed through the Trommel, followed by the unscreened soil/debris. The rotary action of the Trommel screen and the longer retention time in the drum (versus the vibrating deck screen) expedited the drying and break up of the clay/silt soil clumps and reduced the volume of material requiring visual inspection and testing for OE and OE-related items. As the clay/silt soil clumps broke up, the fines would then pass through the mesh of the rotary drum and were discharged from a conveyor belt. This soil was then considered to be free of OE or OE-related items. On average, 75 percent of material placed into the Trommel were discharged as fines.

Items too large to pass through the mesh of the rotary drum were eventually discharged out of the end of the drum and onto an oversized material conveyor. Two UXO specialists visually inspected the oversized material conveyor and removed all visible OE and OE-related items as they traveled past on the conveyor. As a fail-safe measure, a third UXO specialist was stationed at the end of the oversized material conveyor to visually inspect and retrieve any missed OE or OE-related items as they were discharged from the oversized material conveyor. The clay/silt soil clumps that survived the Trommel and were discharged from the oversized material conveyor were, for the most part, small enough as to no longer be able to conceal a 20-mm or larger OE item, and were classified as OE-free. Once screening was completed, both the Trommel and the area around it were inspected for any remaining OE or OE-related items.

The clay/silt soil clumps that, after passing through the Trommel, remained large enough to possibly still contain OE or OE-related material were spread out in a 6-inch-thick layer over an area that was previously cleared of all magnetic anomalies. This material was then tested by UXO specialists using the White's spectrum XLT metal detector. All magnetic anomalies encountered were investigated for the possibility of being OE or OE-related items. All OE or

OE-related items were moved from the oversized material conveyor and discharge area, and the soil and debris were then stockpiled for subsequent off-site transportation and disposal.

A CAT 963 track loader was utilized to create stockpiles of screened fines. The stockpiles were staged in Grid Cells A-6, A-7, B-6, and B-7. The mechanical screening process that produced the fines also eliminated the possibility that the fines were contaminated with any OE or OE-related items. However, the stockpiles were also assessed for potential chemical contamination, and segregated accordingly. Each stockpile was assigned a specific nomenclature based on visual observation of the soil that was fed into the screen. "C" represented potentially clean soil based on visual observation. There were four potentially clean stockpiles generated from the removal of approximately the top 2 feet of the disposal/fill area. "D" represented potentially lead-contaminated soil based on visual similarities to the lead-containing, blackish-colored soil from Grid Cells B-2 and B-3. Based on this visual classification system, there were six stockpiles that potentially contained elevated concentrations of lead. These stockpiles were placed on, and covered with, 10-mil polyethylene liner. The soil from the four suspected clean stockpiles and the six suspected contaminated stockpiles was sampled and analyzed for proper classification (Sections 4.14.1, 15, and 16).

4.10.2 Excavation of Debris Interval Below Elevation of Wetlands Grade

In general, the wetland ground elevations adjoining the site range from approximately 7 feet above mean sea level (msl) along the southwestern border of the site to approximately 4 feet above msl along the northeastern border. On the whole, the elevation of the native ground encountered following the excavation of the debris at the site patterned these elevations and slope inclination. However, after the site was excavated down to the elevation of the surrounding wetlands grade, a large area (approximately 64,700 square feet) encompassing Grid Cells B-2, C-2, C-3, C-4, D-2, D-3, D-4, and D-5 had noticeable amounts of debris remaining (Figure 4-2). A CAT 330 excavator was used to dig 28 test pits to determine the depth and extent of the debris below the adjoining wetland elevation (Figure 4-2). The test pits indicated that the thickness of the debris interval within the above grid cells varied between 2 and 6 feet, or from an approximate depth of 2 feet above msl to 2 feet below msl. An approximate 35,400-square-foot area required excavating an average of 3 feet below the surrounding wetland grades or to an approximate depth of 1 foot above msl. Approximately 26,000 square feet along the north and northeast of the site required excavating an average of 2 feet below the surrounding wetland grades or to an approximate depth of 2 feet above msl. A smaller area (approximately 3,300 square feet in size within Grid Cells C3 and C4) required excavating an average of 6 feet deeper than the surrounding wetland grades or to an approximate depth of 2 feet below msl. Once the limits were established, excavation of the debris interval began in Grid Cell B-2 on January 22, 2002. The excavator removed the entire debris interval in each grid cell before moving to an adjacent grid cell. Excavation continued in each grid cell until native material associated with the wetlands was encountered at the floor of the excavated area. FWENC construction supervisors

and site engineer verified the acquisition of native material. A UXO specialist also witnessed each pass with the excavator bucket and verified (using the White's spectrum XLT metal detector) that the bottom of the excavation did not contain OE or OE-related items. The excavator was then allowed to move to the next grid cell to continue removal of the debris interval. Approximately 6,000 cubic yards of debris/soil were generated from the excavation below the elevation of the wetlands grade. This material was extremely wet and saturated and was spread out and left to dry prior to screening with the Trommel screen.

Backfilling of the areas excavated below wetlands grade was performed concurrently with excavation. The backfill material consisted of previously excavated and screened soil from the upper portions of the disposal fill at IRP Site 5. The material used as backfill was previously sampled and analyzed and classified as non-hazardous. A large off-road dump truck was used to haul the backfill material. A dozer was then used to compact the backfill material by track-walking over the backfill.

The debris interval consisted of groundwater-saturated soil, metal banding, large balls of wire, broken glass, glass vials, large pieces of wood, and lengths of steel wire and cable. A number of crushed drums with a brown, pungent residue were also encountered in the debris interval. These drums were placed into 80-gallon-sized overpack poly-drums and transported to the NAVWPNSTA Seal Beach investigation-derived waste (IDW) storage facility located at Bolsa Avenue and 8th Street for subsequent sampling and analysis.

4.10.2.1 Confirmation Grid Cell Sampling

After the removal of the debris interval located below the elevation of the surrounding wetlands grade, confirmation sampling was performed. Grid Cells B-2, C-2, C-3, C-4, D-2, D-3, D-4, and D-5 were each subdivided into four 50-foot by 50-foot areas. One confirmation floor sample was collected at a random location from each subdivision where debris was removed (Figure 4-2). A total of 23 samples were collected and analyzed. All 23 samples were analyzed for select metals that included barium, chromium, copper, lead, and zinc. The samples collected from the bottom of the excavation were not analyzed for the remaining TAL metals (antimony, arsenic, beryllium, cadmium, cobalt, mercury, molybdenum, nickel, selenium, silver, thallium, and vanadium). The reason for this was that the concentrations of these metals in the stockpile samples were very low and thus did not pose any significant concern.

Barium concentrations ranged from 57.5 mg/kg in Grid Cell C4-A to 414 mg/kg in Grid Cell C2-A. Barium concentrations were well below the statistical background level (468 mg/kg) and geochemical background level (856 mg/kg).

Chromium concentrations ranged from 16.9 mg/kg in Grid Cell D5-A to 405 mg/kg in Grid Cell D3-B. Of the 23 samples, only Sample 0023-102 from Grid Cell D3-B had a chromium

concentration above the statistical and geochemical background levels of 46.24 mg/kg and 95 5 mg/kg, respectively. The mean concentration of chromium is calculated to be 42.37 mg/kg.

Copper concentrations ranged from 13.3 mg/kg in Grid Cell C4-D to 56 4 mg/kg in Grid Cell B2-D. Only four samples had concentrations exceeding the statistical background level for copper (38.04 mg/kg). Copper concentrations were not detected above the geochemical background level for copper (88 6 mg/kg). Mean concentration for copper is calculated to be 25.5 mg/kg.

Lead concentrations ranged from 4 2 mg/kg in Grid Cell C2-A to 270 mg/kg in Grid Cell B2-D. With the exception of three samples (0023-092 at 270 mg/kg, 0023-098 at 50.8 mg/kg, and 0023-102 at 126 mg/kg), lead concentrations for the remaining 20 samples were well below the statistical background concentration (35.7 mg/kg). The mean concentration for lead is calculated to be 28.37 mg/kg.

Zinc ranged from 28.9 mg/kg in Grid Cell C2-A to 540 mg/kg in Grid Cell D3-A. Four out of 23 samples had zinc concentrations exceeding the statistical background level for zinc (177.17 mg/kg). Only one sample out of the 23 samples analyzed reported a zinc concentration exceeding the geochemical background concentration level for zinc (499 mg/kg). The mean concentration of zinc is calculated to be 132 05 mg/kg. Sample results are included in Table 4-1. See Appendix B for all analytical data.

4.10.3 OE Removal Quality Control

All material at IRP Site 5 that was scrutinized for OE and OE-related material by the UXO specialists was also subjected to QC checks. These QC checks were performed at regular intervals by the FWENC UXO QC/Safety Officer to ensure that the work of the UXO specialists was correct, complete, and in compliance with the contract. All OE-removal QC was performed in accordance with Department of Defense (DoD) Test Method Standard, DoD Preferred Methods for Acceptance of Product (MIL-STD-1916).

All excavated material that was small enough to pass through the 1/2-inch-wide by 3-inch-long mesh openings of the vibrating deck screen or 3/4-inch-square mesh openings of the rotary Trommel screen was considered free of OE and OE-related items. The focus of the OE removal QC process was on the material that was either not screened (for example, vegetation and surface debris) or was physically too large to pass through the Trommel mesh (clay/silt soil clumps and suspect items – hard, encrusted objects that due to their size and shape could potentially be OE or OE-related, but could not be positively identified).

On average, 75 percent of material placed into the Trommel was discharged as fines and 25 percent was discharged as oversized material. The FWENC UXO QC/Safety Officer performed OE removal QC on 32 out of every 150 cubic yards of oversized material. Four times

each day the FWENC UXO QC/Safety Officer observed the material on the oversized material conveyor and coming off the end of the oversized material conveyor. On each of the four occasions, observation continued until 8 cubic yards of oversized material was produced. If any OE, OE-related, or suspect items were witnessed by the FWENC UXO QC/Safety Officer and were not removed by the three UXO specialists, the 8 cubic yards of oversized material was failed and re-processed through the Trommel.

QC was also performed on the clay/silt soil clumps that, after passing through the Trommel, remained large enough to possibly still contain OE or OE-related material. The QC was performed on each batch of approximately 100 cubic yards of this material by spreading it out in 6-inch-thick layers over a 100-foot-long by 50-foot-wide or equivalent size area that was previously cleared of all magnetic anomalies. Two FWENC UXO personnel performed the inspection by first delineating two adjacent 5-foot-wide lanes using highly visible, colored rope. Each of the FWENC UXO personnel then methodically walked the length of a lane, using both visual inspection and a White's spectrum XLT metal detector. All magnetic anomalies encountered were investigated for the possibility of being OE, OE-related, or suspect items. Subsequently, two new 5-foot-wide lanes were created and the process was repeated until the entire area of spread material was inspected. The FWENC UXO QC/Safety Officer performed QC checks with a White's spectrum XLT metal detector in the lanes previously cleared by the UXO specialists. If OE, OE-related items, or suspect items were encountered by the FWENC UXO QC/Safety Officer, the lane is question was re-walked by the UXO specialist and re-checked by the FWENC UXO QC/Safety Officer. This process was also used on the vegetation stockpiles that were created as a result of clearing and grubbing operations. This process was repeated until all oversized material was inspected and all OE or OE-related items were removed or no longer found. This material was considered clear of OE or OE-related items and cleared for off-site disposal by FWENC UXO QC/Safety Officer and FWENC SUXOS.

The debris generated from clearing and grubbing, as well as the larger pieces of debris that could be separated prior to screening of the soil, was visually examined by the UXO specialists for the presence of OE or OE-related items. This material was deemed by the FWENC UXO QC/Safety Officer as lower risk material because all items were readily discernible. Nonetheless, the FWENC UXO QC/Safety Officer performed a separate inspection of this material to validate the work of the UXO specialists.

4.11 OE IDENTIFICATION, STORAGE, DISPOSAL, AND CERTIFICATION

All work was performed in accordance with SOP-3, Ordnance and Explosives/Unexploded Ordnance Disposal and/or Demilitarization of Ordnance and Explosives Material in Appendix C of the Work Plan (FWENC, 2001a).

During the course of project, any OE-related material identified by the FWENC UXO personnel (UXO specialists, UXO QC/Safety Officer, or SUXOS) was placed into a labeled, 55-gallon

drum and temporarily stored on site. At the end of each workday, the drum was sealed. When the drum was filled to capacity, it was transferred to Building 84 for storage. Building 84 is a magazine specifically designed for OE storage and is located in a secured area at NAVWPNSTA Seal Beach. OE-related material or OE scrap was defined as any component of ordnance or explosive munitions that may have come into contact with energetic material and could have energetic residue remaining. Examples of OE scrap encountered during the project included expended cartridge and shell casings, expended flash and burster tubes, expended rocket motor tubes, and chunks of unknown pyrotechnic mixture. In total, there were 21 55-gallon drums, totaling approximately 7,000 pounds that were filled with metallic OE scrap during the project. Recovered pyrotechnics were stored in a separate 55-gallon drum.

All OE items identified by FWENC UXO personnel were investigated by the SUXOS, and a determination was made as to whether or not the item was safe to move. Items deemed safe to move were stored on site in a designated container pending transfer at the end of the workday to either Building 84 or Building 823. Building 823 is a locking/secured magazine specifically designed for OE storage and is located in a secured area at NAVWPNSTA Seal Beach. A complete inventory of high-explosive OE and OE-related items recovered from IRP Site 5 is provided in Table 4-2.

If an OE item was deemed by the SUXOS as unsafe to move, site activities were ceased and DON EOD personnel were notified in order to make a further determination about the object in question. During the project, the DON EOD was summoned to the site on two occasions. The first occurrence was following the October 3, 2001, incident when a 60-mm mortar was encountered after coming off of the screen. On that occasion, the DON EOD determined that the mortar was safe to move and they relocated the item to Building 823. The second occasion occurred on March 18, 2002, when a number of OE items were encountered while excavating the perimeter berm. On that occasion, the DON EOD determined that the items were unsafe to move and detonated the items in place at the site. Prior to the detonation, a 1,000-foot exclusion radius from IRP Site 5 was established by the DON EOD. This included the evacuation of personnel working in Building 235 just west of the site. The exclusion radius was enforced by NAVWPNSTA Seal Beach police.

A number of suspect items were also encountered during the excavation and screening process. The suspect items were hard, encrusted objects that due to their size and shape could have potentially been OE, but because of their deteriorated condition could not be positively identified. The suspect items were, therefore, assumed to be OE and handled and stored as such.

In total, 1,083 high-explosive OE items and 275 items suspected as being potential OE were recovered from IRP Site 5 over the course of the project.

4.11.1 OE Scrap Flashing/Disposal

The OE scrap included expended shell casings and OE-related parts that had come in contact with explosive powder. These OE scrap metals required flashing or burning of explosive residue present on and/or within the objects. The flashing was performed using a HURD brand propane gas burner unit stationed at Building 95. The HURD unit is designed to contain the force of a low order detonation and for the disposal of ammunition ranging from 22 caliber to 20-mm shells and fully loaded rounds. The OE scrap was placed in the burner and flashed in small loads of approximately 60 pounds. Each load of the scrap metal was heated at temperatures of at least 400 degrees Fahrenheit inside the burner for 20 minutes and then left in the burner and allowed to cool for approximately 20 minutes. The scrap was then tested for residues using Expray (15M 1553) explosive test wipe samples. Wipe samples were collected which immediately showed whether unconsumed energetic residue was still present. If unconsumed energetic residue was detected on the wipe sample, the load was re-flashed for an additional 20 minutes. The OE scrap from all 21 drums was flashed over a 17-day period between February 26, and March 28, 2002. The flashed OE scrap metal weighed approximately 7,000 pounds. This material was turned over to NAVWPNSTA Seal Beach for recycling through the Defense Reutilization and Marketing Office (DRMO).

4.11.2 OE Detonation

OE from IRP Site 5 was rendered inert by detonation. Each detonation or shot was performed by the DON EOD personnel at Building 95 at NAVWPNSTA Seal Beach. Building 95 is a bunker designed to contain the force of high-explosive detonations. The OE was disposed on six occasions on November 7 and 8, 2001, December 6, 2001, February 13, 2002, and April 10 and 24, 2002. On each occasion, the OE was placed in the bottom of a 2- to 3-foot-deep depression located in the center of the bunker. Explosive charges were then placed on top of the OE to be detonated. The explosive charges used were powerful enough to consume all energetic material within the OE and also fragment the metallic OE casings. A skip loader/backhoe was then used to place soil on top of the explosive charges. Prior to the detonation, a 1,000-foot exclusion radius from Building 95 was established by the DON EOD. No personnel or vehicles were allowed within the exclusion radius. The exclusion radius was enforced by NAVWPNSTA Seal Beach security.

Immediately following the detonation activities, the trench in which the OE and explosive charges were placed for detonation was cleared. The trench was first cleared by the DON EOD to ensure that all charges had been detonated and that the area was safe to approach. Afterwards, a FWENC UXO specialist would sweep the trench with a White's spectrum XLT metal detector to locate the fragmented, metallic OE remnants. Each fragment was hand-excavated by the DON EOD and verified as not posing further hazard. The DON EOD retained custody of the metal fragments for further demolition. All 1,083 high-explosive OE items and all of the 275 suspect OE items were rendered inert by detonation at Building 95.

On April 10, 2002, after the sixth and final shot, the soil in the depression was excavated using a backhoe. Approximately 30 cubic yards of loose soil from the sidewalls and floor of the trench were removed, stockpiled, sampled, and covered with plastic pending receipt of analytical results. Soil samples were also collected from the sidewalls and floor of the trench, as well as the ground surface immediately adjacent to the trench.

The analytical results for the soil stockpile indicated elevated concentrations of lead. This soil was loaded into two 20-cubic-yard roll-off bins and transported off site by ECDC for disposal as non-RCRA hazardous waste. Analytical results for the samples collected from the floor and sidewalls indicated lead concentrations of 13.0 mg/kg, 16.4 mg/kg, 18.0 mg/kg, 18.6 mg/kg, and 56.8 mg/kg. Analytical results for the samples collected from the area surrounding the trench indicated lead concentrations of 75.0 mg/kg and 37.0 mg/kg, which slightly exceeded the NAVWPNSTA facility-wide background concentration of 35.7 mg/kg.

4.11.3 OE Certification

All material removed from IRP Site 5 was certified by the FWENC SUXOS, to the best of his knowledge and belief, to not contain energetic materials or items of a dangerous or hazardous nature. This certification was achieved as a result of the mechanical screening of the soil, visual inspection and testing with metal detectors of the oversized material by UXO personnel, flashing and testing of OE scrap, and disposal of OE via detonation. A copy of the ordnance certification form, DD Form 1348-1A (July 1991), is included in Appendix C.

4.12 POST-EXCAVATION GEOPHYSICAL SURVEY

After the disposal/fill area (including the portion located below the elevation of the wetlands grade) was removed and backfilled, a post-excavation geophysical survey was performed. The Leica DGPS, in conjunction with an EM-61 electromagnetic induction sensor and data recording device, was used during the survey. Prior to use, the equipment was calibrated using the known depths and orientations of the buried metallic objects located at the UXO QC test bed. The purpose of the survey was to document the extent to which the metallic objects were removed and to locate any remaining buried metal that could potentially be OE or OE-related items. The results of the post-excavation geophysical survey are shown in Figure 4-3. The pink areas in Figure 4-3 indicate areas that contain the greatest concentration of or large size metallic objects such as metal banding, balls of wire, steel wire, cable, and plates. Fuchsia, red, orange, and yellow indicate areas with fewer metallic objects or smaller size metallic objects. Green indicates that no metal is present. The post-excavation geophysical survey documented the existence of 1,095 magnetic anomalies. Of the 1,095 anomalies, 363 were large enough to potentially be OE or OE-related.

4.12.1 Anomaly Verification

Each of the 363 anomalies that were large enough to potentially be OE or OE-related were investigated. The location of each anomaly or group of anomalies was re-acquired, using the Leica DGPS, based on the coordinates documented during the post-excavation geophysical survey. Each location was marked with a survey stake that included the estimated depth of the object. Each anomaly was excavated either by hand or with the assistance of a backhoe. UXO specialists observed the excavation and swept each hole to locate the object in question. No OE or OE -related items were encountered during excavation of the 363 anomalies. All excavations were backfilled.

4.13 MONITORING AND EMISSIONS CONTROL

This section describes the methods that were used to quantify airborne contaminants, if any, and mitigate exposure to site personnel. This section also describes the methods used to monitor, control, and minimize the off-site migration of airborne contaminants. Monitoring included monitoring the workers during site activities and ambient air monitoring for quantifying off-site migration of site contaminants.

4.13.1 Personnel Monitoring During Site Operations

Identification and quantification of airborne contaminants during the removal activities at IRP Site 5 were an essential component of the Final Site-Specific Health and Safety Plan (FWENC, 2001b) requirements. Potential airborne contaminants were quantified on the site with the use of a real-time, direct-reading dust monitoring instrument. A MIE PDM-3 MiniRam dust monitoring device was used for this purpose. The dust monitoring results were used by the Site Health and Safety Specialist to delineate areas where PPE was needed and for selecting the appropriate PPE.

The FWENC Construction QC/Safety Officer, responsible for health and safety oversight, was on site during performance of the work. The FWENC Construction QC/Safety Officer's duties included performing real-time ambient air monitoring at regular intervals during excavation and screening activities and oversight of construction-related (for example, use of heavy equipment) safety. Monitoring was performed for the presence of organic vapors, carbon monoxide, explosive gases, hydrogen sulfide, percent oxygen, fugitive dust, and radiation. The accuracy/calibration of all monitoring instruments was verified and documented by the FWENC Construction QC/Safety Officer on a daily basis. At no time during removal activities were explosive gases or hydrogen sulfide detected. Organic vapors (ranging from 0 to 20 parts per million), likely associated with the natural degradation of biomass in the surrounding wetlands, were encountered on a limited basis during excavation at the site perimeter and upon acquisition of natural grade within the excavation area. Radiation levels (alpha, beta, gamma) throughout the excavation area did not exceed background levels of 0 to 0.02 milli-Roentgens per hour. Fugitive dust emissions were controlled using water from the 2-inch-diameter water line located adjacent to the excavation area.

Instruments were calibrated before and after each work shift, and the results of the monitoring were documented on a daily basis. In general, readings in the breathing zone were taken and documented twice a day: in the morning and the end of the workday. Based on air monitoring data and the established action levels, the level of protection was upgraded or downgraded accordingly. The site workers were occasionally required to wear full-face respirators during the visual inspection of the screening operations and while observing the material that was passing through the Trommel conveyor belt. The field crew and equipment operators also used dust masks on an as-needed basis when necessary. Dust masks and full-face respirators were also used during concrete crushing activities.

Monitoring was performed in the breathing zone of workers within the exclusion zone areas. Excavations 4 feet or deeper were monitored for oxygen and combustible gases using MSA 261 LEL-02 monitoring device prior to personnel entering the area.

4.13.2 Emissions Control

All removal activities were conducted in compliance with substantive portions of SCAQMD Rules 401(b)(1)(A), 403, 404, and 405 pertaining to fugitive dust emissions and discharge of lead or lead compounds. Area sampling was performed for total suspended particulate (TSP) and laboratory testing and analysis for lead. Air samples were analyzed by Health Sciences Associates Laboratories located in Los Alamitos, California. Permissible Exposure Limits or Threshold Limit Values were established for lead in accordance with the SCAQMD guidelines. TSP was reported ranging from 0.08 mg/cubic meter (m^3). Lead concentrations were reported ranging from non-detect levels to 4 micrograms (μg)/m^3.

Dust control was implemented on a continuous and regular basis for the duration of the project. Each workday, prior to excavation or earthwork activities, water was sprayed over the haul roads within the site and over the planned excavation areas to minimize the amount of dust generated. A 2,000-gallon water truck was used for water application in excavation areas and on haul roads. In addition, when earthmoving activities were being conducted at several locations requiring dust control at the same time, several 50-foot-long, 2½-inch-diameter fire hose sections were coupled together and used for spraying.

Dust emissions were also controlled by placing 10-mil polyvinyl chloride (PVC) liner sheets over the stockpiled material. Moreover, all loaded railcars were sprayed with CHEM-LOC 411 vinyl acrylic copolymer liquid emulsion prior to leaving the site in order to minimize wind erosion and dust emissions during transport to disposal facilities. CHEM-LOC 411 is a liquid binder and stabilizer used to coat storage piles and bulk material transported in open railcars. The material seals the fine particles and binds them to prevent their erosion and loss. Roll-off bins were covered with plastic tarps before departure from the site.

4.14 FIELD SAMPLING METHODS AND PROCEDURES

4.14.1 Stockpile Sampling

One composite soil sample was collected from each estimated 500-ton batch of stockpiled soil. Composite samples were generated by collecting five soil samples in 8-ounce, pre-cleaned glass jars at random locations and depths from each of the estimated 500-ton batch of stockpiled soil and submitted to APCL for homogenization and analysis. A total of 81 composite samples were analyzed for TAL. Every third sample was also analyzed for VOCs, SVOCs, and PCBs.

In order to classify the soil for disposal purposes, each stockpile was divided into 500-ton sections and sampled. Each sample was comprised of a composite from five locations within each 500-ton section. This was accomplished as follows. In each 500-ton section, five locations and depths were randomly generated. A 9-ounce jar was filled with soil at each of the five locations and submitted to the laboratory for analysis. The soil from the five jars was then composited at the laboratory and analyzed.

4.14.2 Sample Containers

Soil sample containers consisted of 8-ounce, pre-cleaned, unpreserved glass jars. APCL performed the analyses and was responsible for supplying properly decontaminated containers for field sampling. The liquid sample container used to collect the liquid waste sample for total petroleum hydrocarbons analysis consisted of a 250-mil plastic bottle.

4.14.3 Sample Preservation

Before transportation and storage, each soil sample was preserved by cooling to 4 degrees Celsium (°C). Sample preservation was performed in the field by a qualified sampling specialist. Once collected and labeled, all samples were immediately stored in cold chests at 4 ±2°C using ice to maintain the temperature.

4.14.4 Sample Packaging and Shipment

Sample containers were placed into a plastic cooler with ice immediately following collection. In order to limit the possibility of breakage, the glass sample containers were segregated with bubble wrap or other similar material. The sample coolers were picked up at the site by the laboratories' courier and delivered to the laboratories.

4.14.5 Sample Documentation

The samples were sealed with a tamper-proof seal and clearly identified on a sample label affixed to the sample container. Each sample label contained the sample number, date of sample collection, time of sample collection, and depth of sample (as applicable).

4.15 STOCKPILE SAMPLE ANALYSIS RESULTS

All stockpile soil composite samples were analyzed for TAL metals using EPA Method 6010B. In addition, every third stockpile sample was also analyzed for VOCs using EPA Method 8260B, for SVOCs using EPA Method 8270C, and for PCBs using EPA Method 8082. Soil with Total Threshold Limit Concentration (TTLC) of any of the metals that was greater than or equal to 10 times the respective Soluble Threshold Limit Concentration (STLC) value, but less than or equal to 20 times the Toxicity Characteristic Leaching Procedure (TCLP) value for that metal was designated as potentially non-RCRA hazardous. These samples were subjected to California Waste Extraction Test (WET) analyses using EPA Method 6010B. If the concentration of a metal in the STLC extract exceeded that metal's respective STLC value, the soil associated with the sample was classified as non-RCRA California hazardous waste.

If the total concentration of any of the metals exceeded 20 times the metal's respective regulatory TCLP value, TCLP extraction testing (EPA Method 1311) was performed. None of the TCLP concentrations for any metals exceeded the EPA regulatory levels for a RCRA-hazardous waste; therefore, no soil sample or associated stockpile was classified as RCRA-hazardous waste.

Samples of excavated and stockpiled soil material that did not contain metals concentrations exceeding their respective WET extract level for California hazardous waste or the TTLCs were classified as non-hazardous. These soils were reused a backfill material to backfill the excavations that were deeper than the surrounding wetland elevations.

The concentration of the TAL metals (17 analytes), with the exception of two metals (copper and lead), were below their regulatory TTLCs. The concentration of copper in the stockpile samples ranged from 10.5 mg/kg to 3,490 mg/kg (Table 4-3). Two stockpile samples with copper concentrations of 3,380 mg/kg (sample 0023-112) and 3,490 mg/kg (sample 0023-043) were identified which exceeded the regulatory TTLC value of 2,500 mg/kg for copper. The stockpiled soils associated with these two samples were classified as California hazardous waste. A total of 11 stockpile samples indicated copper concentrations greater than 250 mg/kg, or 10 times the regulatory STLC limit of 25 mg/L for copper. These samples were subjected to WET analysis. Copper concentrations in the WET extract ranged from 0.146 mg/L to 4.81 mg/L, which were well below the regulatory STLC value of 25 milligrams per liter (mg/L) for copper. Therefore, none of the stockpile soils were classified as hazardous based on the STLC results for copper.

Chromium was detected in all stockpile soil samples ranging from as low as 8.6 mg/kg to as high as 128 mg/kg. Of the total 81 stockpile samples analyzed, only four samples had indicated chromium concentrations exceeding 50 mg/kg, or 10 times the regulatory STLC limit of 5 mg/L for chromium (Table 4-3). All four samples were subjected to WET analysis. STLC concentrations ranged from 0.577 mg/L to 1.11 mg/L for the four samples tested by WET. Only one sample indicated chromium concentrations exceeding 100 mg/kg, or 20 times the regulatory

TCLP limit (5 mg/L) for chromium. This sample was subjected to a TCLP test. The TCLP result indicated 2.6 (estimated value) mg/L of chromium in the extract. Therefore, none of the soil stockpiles were classified as RCRA or California hazardous waste based on chromium concentrations.

Lead was the primary driver for classification of the stockpile soils. Lead concentrations detected in the stockpiles ranged from as low as 14 mg/kg to as high as 1,660 mg/kg. From the total of 81 stockpile samples analyzed, a total of 57 samples indicated lead concentrations exceeding 50 mg/kg, or 10 times regulatory STLC limit (5 mg/L) for lead (Table 4-3). Of the 57 samples, two samples had indicated lead concentration of 1,040 mg/kg and 1,660 mg/kg (samples 0023-058 and 0023-032, respectively), exceeding the regulatory TTLC value of 1,000 mg/kg for lead. Therefore, the stockpiled soils associated with these two samples were classified as California hazardous waste. Of the 57 samples, 42 had indicated lead concentrations of 100 mg/kg or greater, exceeding 20 times the regulatory TCLP limit (5 mg/L) for this compound. All 57 samples were subjected to WET analysis, and 42 samples were subjected to the TCLP test. Forty of the stockpile samples indicated STLC concentrations ranging from 5.05 mg/L to 177.00 mg/L, requiring classification of the soils (identified with the above stockpile samples) as California hazardous. The TCLP test results ranged from 0.037 mg/L to 1.25 mg/L of lead. Therefore, none of the TCLP analyses exceeded 5 mg/L, hence, none of the excavated soil was classified as RCRA-hazardous waste based on lead concentration results.

PCBs, VOCs, and SVOCs were for the most part not detected in the stockpile soil samples. Of the 25 samples analyzed for PCBs, four samples indicated Aroclor 1254 concentrations ranging from 9 microgram per kilogram (µg/kg) (estimated value) to 210 µg/kg. Sixteen samples indicted Aroclor 1260 concentrations ranging from 5 µg/kg (estimated value) to 88 µg/kg. A summary of the PCBs, VOCs, and SVOCs analytical test results is provided in Table 4-4.

Forty stockpiles were classified as California hazardous waste based only on lead TTLC or STLC test results; and two stockpiles were classified as such based on lead and copper STLC concentration results. A summary of the metals analytical test results for all the stockpile samples is provided in Table 4-3.

4.16 WASTE CLASSIFICATION AND DISPOSAL

There were several waste streams that resulted from IRP Site 5 NTCRA activities. These waste streams included excavated soil, decontamination rinse and wastewater, well abandonment drill cuttings, used PPE, miscellaneous debris, trash and solid waste, and recyclable concrete and asphalt debris.

This section describes the disposal methods for the waste materials generated at the site including solid waste, wastewater, contaminated soil, and uncontaminated soil and debris. All waste material generated at IRP Site 5 was disposed at CERCLA-approved waste disposal

facilities. The selection and use of the disposal facilities were subject to approval under FWENC Subcontractor Qualification Procedures.

Waste disposal consisted of soil, debris/trash, vegetation, overpack drums containing drums with residue, and the 55-gallon drum that was filled with chunks of pyrotechnic mixture over the course of the screening operation.

4.16.1 Soil

Of the ten stockpiles of screened soil and oversized material, which totaled 26,700 cubic yards (or approximately 35,000 tons), 14,500 cubic yards (approximately 18,915 tons) were determined through waste characterization sample results to contain lead levels classifying the soil as non-RCRA California hazardous waste and requiring off-site disposal. Approximately 4,000 cubic yards (5,200 tons) of the screened soil contained lead levels below the NAVWPNSTA facility-wide background concentration of 35.7 mg/kg. This soil was trucked to and stockpiled in an area located north of IRP Site 7 for later use as cover material at that site. The stockpiled soil was covered with 10-mil PVC liner to prevent erosion. Approximately 7,500 cubic yards or (9,200 tons) of the screened soil was classified as non-hazardous, but with lead levels above the NAVWPNSTA facility-wide background concentration. This soil was used at IRP Site 5 as backfill material along the southern railroad easement and at the area where excavation occurred below the elevation of the surrounding wetlands.

Following excavation, stockpiling, and classification, the oversized byproduct material, debris, and soil classified as California hazardous waste were loaded onto railcars or roll-off bins and hauled to the ECDC disposal facility located in East Carbon, Utah. The ECDC facility is a regulatory- and CERCLA-approved and permitted disposal facility. A total of 200 railcars, with load capacities ranging from 80 tons to 100 tons, were used for loading and transporting contaminated soils to the disposal facility. Union Pacific Railroad Company supplied the railcars and transported the material to the destination. In addition, two 20-cubic-yard-capacity roll-off bins were also used to load, haul, and dispose of approximately 30 tons of non-hazardous contaminated soil generated at the Building 95. The roll-off bins were supplied by ECDC. The loaded roll-off bins were transported on city streets by Ocean Blue Environmental Services to the Union Pacific Railroad yard in Los Angeles, California. From there, the roll-off bins were placed on rail and transported by Union Pacific Railroad to the ECDC disposal facility in East Carbon, Utah.

A CAT 980J wheel loader with a 7 25-cubic yard bucket was used to load the railcars. A special scale was attached to the loader bucket. The scale was fitted with an electronic digital counter that cumulated the weight of each bucket loaded and emptied into the railcar. The scale had an accuracy of ±5 percent. The railcars had their tare weight and maximum load capacity marked on both sides and generally had a capacity of up to 100 tons each. Care was taken not to overload the railcars. An average of 95 tons of material was placed in each 100-ton-capacity railcar.

Loaded railcars were weighed on a scale near Barstow, California, to ensure compliance with DOT regulations. All railcars were also weighed at their destination at the disposal facility on a certified scale. A uniform hazardous waste manifest was filled out for each loaded railcar or roll-off-bin and submitted to the DON for signature. Original copies of the manifest were provided to the transporter for shipment.

4.16.2 Concrete Debris/Trash and Vegetation

As discussed previously, the clearing, grubbing, and excavation activities generated both concrete/debris and vegetation. The 700 cubic yards of concrete debris that was generated was transferred to IRP Site 7 and crushed for reuse/recycling. The vegetation consisted of approximately 500 cubic yards of iceplant and native wetland vegetation species. This material was also classified as non-RCRA hazardous waste and transported by rail to ECDC's disposal facility in Utah.

4.16.3 Used Personal Protective Equipment

The on-site excavation activities were performed in Level D or modified Level D PPE depending on air monitoring results. All used PPE materials were placed in doubled-up, 42-gallon trash bags and transferred into 55-gallon drums for temporary storage. The 42-gallon trash bags containing used PPE materials, were later placed in railcars along with the contaminated soil and debris, and hauled off site for disposal. A profile and a Uniform Hazardous Waste Manifest was prepared and signed by the DON. Approximately ten 55-gallon drums filled with PPE waste, including used Tyvek® and rubber nitrite gloves, were generated during the NTCRA activities.

4.16.4 Miscellaneous Debris and Drill Cuttings

Miscellaneous debris included wood; metal debris, including steel pipe segments, cables, metal banding and straps, chains, bars, and concrete reinforcing metal encountered and removed during excavation activities; and drill cuttings placed in 55-gallon drums. Approximately 1,200 tons of miscellaneous debris and waste were generated during the NTCRA activities at IRP Site 5. The material was placed in railcars along with the contaminated soil and transported to the ECDC facility for disposal. A profile and a Uniform Hazardous Waste Manifest were prepared and signed by the DON as the generator. The first rail unit, consisting of 94 railcars and containing soil and debris material, arrived at the landfill on February 22, 2002, and unloaded between February 25, through March 11, 2002. The second rail unit, consisting of 97 railcars and containing soil and debris material, was received at the landfill on April 8, 2002, and unloaded between April 8, through 11, 2002.

4.16.5 Drums

In total, there were six drums of material that were generated during the NTCRA activities at IRP Site 5: five 80-gallon-sized overpack drums and one 55-gallon drum. Four of overpack

drums each contained a crushed drum with a brown, pungent solid residue. The fifth overpack drum contained a crushed drum with a brown, pungent liquid residue. The residue in these drums was sampled and analyzed for a range of contaminants. Based on the concentrations of total petroleum hydrocarbons present, the four drums with solid residue were classified as flammable solid waste containing organic, and the drum containing liquid residue was classified as flammable liquid resin. The five overpack drums were hauled off site as non-RCRA hazardous waste on June 3, 2002, for treatment and disposal. These five drums were transported by HAZPAK, Inc., Environmental Services (HAZPAK) (located in Fontana, California) to ONYX Environmental Services, LLC (ONYX) (located in Azusa, California) for treatment by incineration (composite fuel blending) and disposal.

The chunks of pyrotechnic mixture contained in the 55-gallon drum were sampled and analyzed for a range of contaminants, including the 96-hour fish bioassay test. Based on the results of the 96-hour fish bioassay test, the drum containing the pyrotechnic mixture was classified as non-RCRA hazardous waste. This drum was transported by HAZPAK to the ONYX facility in Azusa, California, on June 3, 2002, for treatment through macro encapsulation and landfill disposal.

4.17 TRAFFIC CONTROL

Traffic controls were implemented to provide for efficient completion of the work activities in a safe working environment while minimizing the impact on normal base traffic flow. Traffic controls were required during the transportation of clean excavated soil (soil that does not contain chemical compounds with concentrations that are above the upper limit background values established for NAVWPNSTA Seal Beach) from IRP Site 5 to IRP Site 7. In addition, railroad use requirements were coordinated with the DON to minimize conflicts between rail service to and from the wharf and loading of contaminated soil at the site.

4.18 BACKFILLING AND SITE RESTORATION

Backfilling included placement of screened non-hazardous soil in the deeper excavations in the areas encompassing Grid Cells B-2, C-2, C-3, C-4, D-2, D-3, D-4, and D-5 in order to raise the elevation in these areas to the surrounding wetland elevations. Backfill material was placed in the excavations immediately after the excavation was completed and the bottom of the excavation was visually inspected by the UXO specialists and completely swept with magnetic metal detectors. The backfill was compacted by the heavy articulating truck (CAT D250) tracking and driving over the backfilled surfaces.

Site restoration activities were performed from April 5, 2002, through April 16, 2002. Site restoration activities included final grading of the site (Figure 4-4).

As stated earlier in Section 4.10.2, an approximate 64,700-square-foot area within the above grid cells contained buried debris. The depth of the buried debris ranged from approximately 2 feet above msl to 2 feet below msl. Following the excavation of buried waste in those grid cells, the excavated areas were backfilled and graded to match their adjoining wetland grades, which ranged from 3 feet to 5.2 feet above msl. The entire site was then graded and sloped gently toward an approximate 200-foot-long shallow swale that was constructed near the northeast portion of the site (Figure 4-4). The swale was graded to direct the subsiding tidal water during the low tide to a natural ravine located near the center of the northern boundary of the site. The ravine ultimately flows toward the outer marshland and the ocean. During the extreme high tide, the seawater inundates the entire site and rises to approximately 8 feet above msl. During the extreme low tide, the site is completely drained, and the water levels are approximately 4 feet below the lowest elevations at the site.

4.19 DEMOBILIZATION

Demobilization consisted of removal of the UXO QC test bed, demobilization of all support facilities, cleaning the project site. The activities included decontamination and removal of all construction equipment and materials as well as collection, removal, and proper disposal of all other materials used at the site, including decontamination water and disposable equipment.

4.19.1 Equipment Decontamination

Decontamination was performed on the drilling rig, sampling tools, earthmoving equipment (dozers, excavator, loaders, backhoes, water trucks, and so forth), and miscellaneous equipment (portable storage tanks and so forth). The decontamination procedures outlined below were supervised and accepted by the Site Health and Safety Specialist.

Heavy construction equipment was decontaminated each time it left the exclusion zone. The drilling rig was pressure washed prior to startup of well abandonment and prior to entry into the SBNWR. Decontamination and well water generated during the well abandonment activities was transferred to 55-gallon drums for temporary storage.

Heavy equipment was decontaminated by removing mud and dirt stuck to the equipment. Shovels, picks, and brushes were used to remove hardened soil material. Special attention was paid to the removal of material on and within the bucket and undercarriage of the loaders, dozers, excavators, backhoes, mechanical screening equipment, water trucks, and other heavy equipment used during the NTCRA activities at IRP Site 5.

All sampling equipment (hand augers, trowels, buckets, and large spoons) was cleaned between sample locations following the procedure outlined below:

1. Washed and scrubbed thoroughly with a solution of Liquinox™ detergent and distilled bottled water

2. Rinsed thoroughly with distilled bottled water
3. Rinsed thoroughly with deionized water
4. Allowed to air dry before reuse

4.20 COMPLETION INSPECTIONS

A pre-final completion inspection was held at the site on March 28, 2002. The pre-final inspection was attended by Mr. David Crawley (ROICC), Mr. Si Le (DON RPM), Ms. Pei-Fen Tamashiro (NAVWPNSTA Seal Beach IR Program Manager), Mr. Hamlet Hamparsumian (FWENC Project Manager), Mr. Glenn Nardin (FWENC Project Superintendent), Mr. Carl Jones (FWENC Project QC Manager), Mr. Morris Reed (FWENC UXO QC/Safety Officer), and Mr. Melvin Young (FWENC SUXOS). During the pre-final inspection, a punch-list of items was generated that indicated items requiring completion before the end of the project.

A final completion inspection was performed on April 16, 2002, after all other site restoration activities had been completed. The final completion inspection was a follow-up to the pre-final completion inspection. The ROICC, the FWENC Project Superintendent, and the FWENC Project QC Manager attended the final completion inspection. As a result of the inspection, the ROICC deemed the site work complete. On June 7, 2002, the FWENC Project QC Manager submitted a final Completion Inspection Checklist to the DON. The final Completion Inspection Checklist was signed by the FWENC Project QC Manager and stated that, to the best of his knowledge, all work was complete, correct, and in compliance with the contract.

4.21 PHOTOGRAPHIC LOG

Photographs of the site were obtained during the implementation of the NTCRA activities. These photographs illustrate the work being conducted during excavation, OE screening, soil stockpiling, and backfill placement activities; dust control; OE disposal/detonation activities; and loading of contaminated material for off-site shipment and disposal. The photographs, including representative photographs of the OE items, are presented in Appendix D of this report.

4.22 FIELD CHANGES AND VARIANCES

In order to provide for a safer conduct of the field work, improve production, meet the unexpected changes in the site conditions, and enhance the QC procedures, several field changes were made during the course of the field activities at IRP Site 5. These were actual field changes, variations, and deviations from what was specified in the approved Final Project Work Plan (FWENC, 2001a). A total of six field change requests were prepared. Copies of the field change requests are provided in Appendix A.

5.0 COSTS OF THE NTCRA

This section summarizes the approximate costs of the NTCRA. The approximated costs include the prime contractor's direct and indirect costs, subcontractor costs, taxes, bonds, and insurance.

Activity	Estimated Cost
Project management (including project administration, project controls, procurement, meeting, regulatory interaction, community relations, and so forth)	$ 191,200
Work Plan preparation (includes Remedial Work Plan and as-built report)	$ 68,300
Construction management (including site supervision, QC, and overall project health and safety oversight)	$ 268,200
UXO inspection and oversight (including UXO supervision, UXO QC, and health and safety oversight and inspection by UXO specialists)	$ 398,500
Miscellaneous expenses (including rental of small equipment, field trailer, storage trailers, site vehicles, and purchase of small tools, liners, drums, and so forth)	$ 85,600
Computer usage, reproduction, telephone, office supplies	$ 34,000
Health and safety monitoring equipment, and so forth	$ 5,600
Mobilization	$ 19,400
Site security (installation of temporary fence)	$ 6,200
Clearing and grubbing	$ 3,200
Well abandonment	$ 1,800
Land survey	$ 8,200
Geophysical survey	$ 18,000
Heavy equipment and labor for excavation of soil, debris, UXO	$ 225,700
Mechanical screening and sifting of UXO	$ 237,300
Flashing of OE scrap metal	$ 37,500
Loading and hauling (clean soil from IRP Site 5 to IRP Site 7)	$ 35,800
Solid waste sampling	$ 6,900
Laboratory analysis (including verification soil samples and air monitoring samples)	$ 1,700
Solid waste sample analysis	$ 47,100
Data reduction	$ 6,300
Fuel costs	$ 22,800
Waste transportation and disposal	$ 900,000
Site restoration (including backfill placement and grading)	$ 17,000
Demobilization	$ 17,000
Total Cost of the Removal Action	**$ 2,663,300**

6.0 PUBLIC INFORMATION/ COMMUNITY RELATIONS ACTIVITIES

Community relations activities were conducted by DON to inform the public about the cleanup activities at IRP Site 5 and to encourage involvement in the review of relevant documents and discussion regarding the cleanup plan. These activities are briefly described below.

6.1 PUBLIC INFORMATION

The DON, as lead agency with state agency concurrence, has overall responsibility for public participation activities. To gain a more thorough understanding of the activities associated with this NTCRA, the public was encouraged to review documents contained in the Information Repository. As such, this Draft Closeout Report, the Final Project Work Plan (FWENC, 2001a), the Final AM/RAW (SWDIV, 2001a), the Final EE/CA (BNI, 2001a), as well as other information concerning IRP Site 5 was made available to the public via the Information Repository located in the Mary Wilson Branch of Seal Beach Public Library. This branch of the library is located at 707 Electric Avenue, Seal Beach, California 90740, [(562) 431-3584]. The library is open during the following hours:

Monday and Tuesday	12 noon - 8:00 p.m.
Wednesday and Thursday	10:00 a.m. - 6:00 p.m.
Saturday	10:00 a.m. - 5:00 p.m.
Friday and Sunday	Closed

Documents; reports; newsletters; and Restoration Advisory Board (RAB) meeting agendas, minutes, and presentation materials concerning IRP Site 5 are included in the Information Repository for public review. The Administrative Record Index is maintained by SWDIV and is available to the public at the SWDIV Naval Facilities Engineering Command, 1220 Pacific Highway, San Diego, California 92132.

6.2 PUBLIC PARTICIPATION

As part of the community outreach effort associated with the DoD IRP, the DON established a RAB to encourage local participation in the hazardous waste cleanup program at NAVWPNSTA Seal Beach. The board is a citizen-based committee representing local community interests. To encourage local participation in the NAVWPNSTA hazardous waste cleanup program, the RAB held several meetings during the execution of the NTCRA for IRP Site 5. All meetings were advertised locally in the *Seal Beach Sun* and the *Orange County Register* newspapers in an effort to encourage public attendance and participation. In addition, the DON has prepared a master mailing list of the local community members; and whenever significant cleanup activities or

decisions are planned, the community members are notified by mail for information purposes and involvement.

The Draft EE/CA (BNI, 2000) for IRP Site 5 was reviewed by the RAB members and the regulatory agencies, and the Final EE/CA (BNI, 2001a) was completed and submitted on July 19, 2001. The DON received concurrence on the Final EE/CA (BNI, 2001a) from RWQCB and DTSC, on July 23, 2001, and August 7, 2001, respectively. The recommended action in the EE/CA was used to develop the Draft AM/RAW (SWDIV, 2001b), the decision document for the selected removal action at IRP Site 5. The Draft AM/RAW (SWDIV, 2001b) was subjected to RAB and regulatory review on June 5, 2001. NAVWPNSTA Seal Beach prepared a fact sheet on the planned NTCRA for IRP Site 5 and distributed it to the RAB and the public on June 6, 2001. A public notice on the IRP Site 5 Draft AM/RAW (SWDIV, 2001b) was published in *Orange County Register* on June 5 and 25, 2001, and the *Seal Beach Sun* on June 7, 2001. The purpose of this public notice was to invite the interested community members to review the subject Draft AM/RAW (SWDIV, 2001b) and provide comments or questions. A community meeting was held on June 27, 2001. Once all comments and questions from the public, RAB, and agencies were considered, the Final AM/RAW (SWDIV, 2001a) for IRP Site 5 was finalized and issued on August 23, 2001. DTSC, the regulatory agency responsible for the California Environmental Quality Act (CEQA) documentation, issued a Negative Declaration and Public Notice to the community on August 8, 2001. The public comment period began on August 8, 2001, and ended on September 7, 2001. The DON received concurrence from the DTSC on the Final AM/RAW (SWDIV, 2001a) on September 26, 2001.

The Draft Project Work Plan (FWENC, 2001c) for the NTCRA at IRP Site 5 was submitted to the regulatory agencies and the RAB for review and comment on April 9, 2001, and the comment period ended on June 12, 2001. Prior to performing the NTCRA, FWENC, directed by the DON, conducted a presentation for the RAB on March 14, 2001, in order to discuss the cleanup plan and to solicit RAB comments. The Final Project Work Plan (FWENC, 2001a) was completed and submitted on September 21, 2001.

Near the completion of the NTCRA activities, FWENC conducted a presentation for the RAB on March 13, 2002, in order to provide an overview of the work performed at IRP Site 5.

7.0 EFFECTIVENESS OF THE REMOVAL ACTION

The removal of the disposal/fill area at IRP Site 5 at NAVWPNSTA Seal Beach has been completed by FWENC. The primary project objective to minimize the physical hazards associated with OE (20-mm diameter and larger) and, in the process, increase the surface area of the wetlands at IRP Site 5 was achieved. OE and OE-related (OE scrap, shell casings, and so forth) items in the disposal/fill area were located and removed by mechanical screening of the soil and by visual inspection and the use of metal-detecting instruments by trained, UXO specialists. By excavating the disposal/fill area, this also eliminated the elevated area at IRP Site 5, established a grade comparable to the adjacent wetlands, and increased natural tidal salt marsh and wetland area.

The screened soil and oversized material totaled 26,700 cubic yards (or approximately 35,000 tons). Approximately 14,500 cubic yards (18,915 tons) of the screened soil and oversized material required off-site disposal. Approximately 4,000 cubic yards of the screened soil contained metals concentrations below the NAVWPNSTA facility-wide background concentration levels. This soil was trucked to IRP Site 7 for later use. Approximately 7,500 cubic yards of screened soil were classified as non-hazardous and were used as backfill material at IRP Site 5. In addition, the vegetation and debris that were generated during the excavation and screening activities were transported off site for disposal. Approximately 700 cubic yards (1,000 tons) of concrete and rubble were removed and crushed for reuse and recycling. All the material that was removed from IRP Site 5 (screened soil, oversized material, vegetation, and debris) was certified by FWENC to be free of energetic materials or items of a dangerous or hazardous nature.

The NTCRA also resulted in the recovery of 1,083 high-explosive OE items, 275 items identified as suspected or potential OE material, and approximately 7,000 pounds of OE scrap metal. All items identified as OE and suspected as OE-related, were rendered inert via detonation by the DON EOD. The OE scrap metal was thermally flashed to consume any remaining and residual energetic material, and subsequently turned over DRMO for recycling.

As a result of this NTCRA, the risk from potentially explosive ordnance items to humans has been reduced to the extent practicable, the impact to the SBNWR has been minimized, and the existing beneficial uses of the SBNWR have been preserved, thus achieving the RAOs.

In addition, the NTCRA was conducted in a manner that minimized the safety risks to the workers and response specialists and was in compliance with the ARARs.

7.1 RESULTS OF THE FINAL GEOPHYSICAL SURVEY AFTER THE REMOVAL ACTION

The following is a discussion of the final geophysical survey results and the subsequent removal of anomalies identified as potential OE items.

The excavation activities at IRP Site 5 started on October 4, 2001. During the course of the impacted soil removal, the bottom of the excavation was visually inspected and entirely swept with hand-held metal detectors. A final geophysical survey of the site was conducted between March 25 and April 4, 2002, and the excavation of the anomalies considered as potential OE at IRP Site 5 was completed on April 5, 2002. A detailed discussion of the final geophysical survey is presented in Section 4.12. The final geophysical survey results are presented on Figures 4-3.

Following laboratory analysis of the excavated and stockpiled soil samples and proper waste classification, all contaminated soils from IRP Site 5 were transported to and disposed of off site at ECDC, a permitted and CERCLA-approved disposal facility. Afterward, the excavated areas were graded to blend with the immediate wetland surroundings.

7.2 SUMMARY OF RESIDUAL RISK

In addition, approximately 18,915 tons of soil contaminated with lead and classified as California hazardous waste were excavated and removed from IRP Site 5. The residual OE within the excavated areas, as indicated by the geophysical survey results and the results of the visual inspection and magnetometer sweep of the entire site, has been significantly reduced. Furthermore, the final post-excavation geophysical survey identified metallic anomalies that were targeted as potential OE. However, all targeted potential OE anomalies were subsequently staked in the field and uncovered. Of the 324 anomalies identified as potential OE, 320 items were identified as metal scrap, and four were identified as OE-related scrap metal.

Moreover, the disposal activities at IRP Site 5 had ceased since the early 1980s. Therefore, reoccurrence of discharge of the contaminants and OE items detected at this site will not occur.

As a result of the NTCRA, the risks from potentially explosive ordnance items at IRP Site 5 to humans has been reduced to the extent practicable, the impact on the SBNWR has been minimized, and the existing beneficial uses of the SBNWR have been preserved.

8.0 RECOMMENDATIONS

Following the excavation of the OE-impacted soils from the excavation area, a final visual inspection, methodical sweep with hand-held metal detectors, and a thorough geophysical verification survey of the entire site was conducted to confirm whether any OE items remain at the site. The visual survey, geophysical survey, and hand-held magnetometer sweep results indicated that OE-impacted soils at IRP Site 5 were removed, thus achieving the RAOs developed in the Final EE/CA (BNI, 2001a) and the Final AM/RAW (SWDIV, 2001a). The physical hazards associated with OE at IRP Site 5 have been mitigated within the removal area specified and described in the Final Project Work Plan for this project (FWENC, 2001a).

The RSE (BNI, 2001b), the Final EE/CA (BNI, 2001a), and Final AM/RAW (SWDIV, 2001a) had recommended conducting confirmatory groundwater monitoring at IRP Site 5 following the removal action. A Work Plan for groundwater monitoring at IRP Site 5 is currently under development by the DON, which would also include confirmation surface water and sediment sampling.

Therefore, except for performing confirmatory groundwater, surface water, and sediment sampling, the IRP Site 5 NTCRA is complete, and No Further Action is recommended.

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TABLES

TABLE 4-1

SUMMARY OF SELECT METALS LABORATORY ANALYSIS RESULTS FOR SOIL SAMPLES COLLECTED FROM THE AREA EXCAVATED BELOW WETLANDS ELEVATION

Sample Number		0023-074	0023-075	0023-076	0023-077	0023-091	0023-092	0023-093	0023-094
Sample Location		SC-F-1	3C-SE-1	3C-F-2	2C-F-1	B2-B	B2-D	C2-A	C2-B
Sample Date		1/24/2002	1/24/2002	1/25/2002	1/30/2002	3/6/2002	3/6/2002	3/6/2002	3/6/2002
Sample Depth bgs (feet)		6'	4'	7'	7'	2.5'	3'	3'	2'
Analyte	Units								
Metals (EPA Method 6010B)									
BARIUM	mg/kg	180	125	130	88	127	202	414	163
CHROMIUM	mg/kg	42.9	22.3	23.7	23.7	23.5	35.6	20.3	21.3
COPPER	mg/kg	51.8	25.7	16.6	18.5	29.6	56.4	18.1	20.1
LEAD	mg/kg	27.8	7.6	5.2	6.7	8.6	270	4.2	11.1
ZINC	mg/kg	262	153	50.7	58.3	82	403	28.9	62

Sample Number		0023-095	0023-097	0023-101	0023-100	0023-103	0023-106	0023-105	0023-108
Sample Location		C2-C	C2-D	C3-A	C3-C	C3-D	C4-A	C4-C	C4-D
Sample Date		3/6/2002	3/6/2002	3/6/2002	3/6/2002	3/6/2002	3/6/2002	3/6/2002	3/6/2002
Sample Depth bgs (feet)		3'	2'	3'	2'	3'	3'	3'	2'
Analyte	Units								
Metals (EPA Method 6010B)									
BARIUM	mg/kg	137	155	281	80.4	102	57.5	133	72
CHROMIUM	mg/kg	41.3	18.7	26.5	30.5	18.2	21	19.6	21.6
COPPER	mg/kg	38.9	20.2	15	32	15.8	15.4	15.9	13.3
LEAD	mg/kg	7.5	9.6	6.5	11.8	6	5.7	6.6	5.1
ZINC	mg/kg	112	57.9	55.9	95.2	43	51.5	42	47

Sample Number		0023-096	0023-098	0023-099	0023-102	0023-104	0023-107	0023-109
Sample Location		D2-A	D2-B	D3-A	D3-B	D4-A	D4-B	D5-A
Sample Date		3/6/2002	3/6/2002	3/6/2002	3/6/2002	3/6/2002	3/6/2002	3/6/2002
Sample Depth bgs (feet)		2'	2'	2.5'	3'	3'	2'	2'
Analyte	Units							
Metals (EPA Method 6010B)								
BARIUM	mg/kg	73.2	73.1	157	188	74.5	67.4	61.6
CHROMIUM	mg/kg	35.2	17.4	32.7	405	33	23.5	16.9
COPPER	mg/kg	34.1	20.2	20	39.7	28.1	25.2	16.9
LEAD	mg/kg	32.9	50.8	7.5	126	10.3	19.1	5.8
ZINC	mg/kg	109	92.6	540	445	85.5	112	48.6

Notes:

bgs - below ground surface

EPA - United States Environmental Protection Agency

mg/kg - micrograms per kilogram

TABLE 4-2

ORDNANCE INVENTORY AND ACCOUNTABILITY LOG

High Explosive OE Items Placed in Magazine Number 823 (Rated 1.1d)			Other OE Items Placed in Magazine Number 84 (Rated 1.3d)	
Date Discovered and Removed	**Quantity**	**Item Description**	**Quantity**	**Item Description**
9/19/2001	-	-	1	50-cal casing with primer/powder
	-	-	1	20-mm casing with primer/powder
	-	-	1	40-mm casing with primer/powder
9/20/2001	-	-	2	20-mm casing with primer/powder
	-	-	1	20-mm casing with primer/powder
	-	-	1	40-mm casing with primer/powder
10/1/2001	-	-	1	20-mm casing with primer/powder
10/2/2001	-	-	1	Practice Bomb w/black powder spotting charge
	-	-	1	Flash tube for 5" casing
	-	-	1	20-mm casing with primer/powder
	-	-	2	Partial Tail booms for 60-mm mortars
10/3/2001	1	60-mm Mortar w/fuze Turned over to Navy EOD	2	20-mm casing with primer/powder
10/4/2001	-	-	1	20-mm APT, M75
	-	-	1	5-inch Drill Round w/dummy fuze MKXVI (M37A1)
10/9/2001	2	20-mm Projectiles w/o fuzes	1	50-cal Round
	1	57-mm HE Projectile w/base fuze	1	20-mm casing with primer/powder
	-	-	1	50-cal casing with primer/powder
	-	-	10	20-mm casing with primer/powder
	-	-	2	20-mm AP Rounds
10/10/2001	1	57-mm HE Projectile w/base fuze	1	40-mm casing with primer/powder
	2	40-mm HE Projectile	1	20-mm casing with primer/powder
10/11/2001	1	40-mm HE AA Projectile no fuze	1	40-mm casing with primer/powder
	-	-	2	20-mm casing with primer/powder
	-	-	2	20-mm Round partial projectile with primer/powder
	-	-	1	105 fuze no buster assembly
	-	-	1	Unk burster assembly w/base
10/12/2001	2	37-mm HE Projectiles one with fuze	-	-
	1	57-mm HE Projectile fuze unk	-	-
	1	20-mm round projectile w/ fuzes	-	-
	1	Fuze, PD	-	-
10/15/2001	1	20-mm Projectiles w/ fuzes	1	20-mm casing with primer/powder
	1	Fuze, PD	-	-
	1	Fuze, base	-	-
	1	1.1-inch round	-	-
	1	40-mm HE projectile w/partial casing and powder	-	-
10/16/2001	1	60-mm Mortar w/fuze	5	20-mm casing with primer/powder
	1	20-mm HE Round	1	40-mm casing base with primer/powder
	1	20-mm HE Projectile	2	20-mm Round practice
	2	1.1-inch HE Projectile	1	40-mm casing with primer/powder
10/17/2001	1	40-mm HE Projectile	1	20-mm casing with primer/powder
	2	20-mm HE Round, projectile w/ fuzes	1	50-cal casing with primer/powder
10/18/2001	-	-	1	20-mm casing with primer/powder
10/22/2001	1	40-mm HE Round	1	20-mm Practice Round
	2	20-mm HE Round	1	50-cal Round
	1	60-mm HE Mortar	-	-
	1	60-mm HE Mortar	-	-
10/23/2001	1	37-mm HE Projectiles with unk nose fuze	1	7.62-mm Ball Round
	1	37-mm AP Projectile w/unk base fuze	2	20-mm casing with primer/powder
	2	20-mm HE Round	3	40-mm casings with powder
	-	-	1	50-cal casing with primer/powder
	-	-	1	20-mm Practice Round
10/24/2001	2	90-mm HE AP	3	20-mm casing with primer/powder
	4	20-mm HE Rounds	1	50-cal casing with primer/powder
	1	3-lb HE Projectile with Fuze	1	50-cal Ball Round
	1	57-mm Projectile with Fuze	2	7 62 Ball Round
	1	500 series Point Detonating Fuze	-	-
	2	37-mm sub Caliber Fuze	-	-
	2	37-mm HE Projectiles	-	-

TABLE 4-2

ORDNANCE INVENTORY AND ACCOUNTABILITY LOG

High Explosive OE Items Placed in Magazine Number 823 (Rated 1.1d)			Other OE Items Placed in Magazine Number 84 (Rated 1.3d)	
Date Discovered and Removed	**Quantity**	**Item Description**	**Quantity**	**Item Description**
10/25/2001	1	20-mm HE Projectile	1	40-mm casing with primer/powder
	1	57-mm HE Projectile with base Fuze	2	20-mm casing with primer/powder
	2	37-mm Projectile Fuze unk	5	50-cal Ball Round
	2	1 1-inch HE Round	2	50-cal casing with primer/powder
	1	1.1-inch HE Projectile	1	5-inch Projectile Drill Round
	4	20-mm HE Rounds	-	-
	1	5-inch HE Rocket Warhead	-	-
10/29/2001	1	57-mm HE Projectile	1	1.1-inch casing with powder
	1	37-mm HE Projectile	3	20-mm casing with primer/powder
	2	1.1-inch HE Projectile	2	50-cal Ball Round
	2	20-mm HE Projectile	-	-
	3	20-mm HE Rounds	-	-
10/30/2001	3	40-mm HE AA Round	5	20-mm casing with primer/powder
	5	20-mm HE Rounds	13	50-cal casing with primer/powder
	1	90-mm HE AP	8	50-cal Ball Round
	1	Grenade Hand MK II	-	-
	1	Nose Fuze, Type Unk	-	-
10/31/2001	1	40-mm HE AA Round	6	20-mm casing with primer/powder
	1	40-mm HE Projectile	1	M23 Practice Bomb
	1	1.1-inch Projectile	4	50-cal Ball Round
	6	20-mm HE Rounds	6	50-cal casing with primer/powder
	4	90-mm HE AP	-	-
	1	57-mm HE Projectile	-	-
11/1/2001	1	37-mm HE Projectile	8	20-mm casing with primer/powder
	1	1.1-inch HE Projectile	7	50-cal casing with primer/powder
	1	20-mm HE Round	2	50-cal Ball Round
11/5/2001	2	40-mm HE Round	1	40-mm Pyrotechnic mixture
	1	3-inch HE Projectile	1	1.1-inch casing with powder
	1	40-mm HE Projectile	4	20-mm casing with primer/powder
	7	20-mm HE Rounds	2	50-cal Ball Round
	2	20-mm HE Projectile	7	7 62-mm Ball Round
	4	Unk Fuze Components	-	-
	1	60-mm HE Mortar	-	-
11/6/2001	1	40-mm HE Projectile	5	50-cal Ball Round
	3	20-mm HE Rounds	1	Pyrotechnic Filler
	1	20-mm HE Projectile	1	1.1-inch casing with powder
	1	5-inch AP HE Projectile	2	20-mm casing with primer/powder
	-	-	2	50-cal casing with primer/powder
11/7/2001	1	Unk Projectile	1	20-mm casing with primer/powder
	1	Unk Ordnance component	1	50-cal casing with primer/powder
	1	1.1-inch Projectile	-	-
	1	20-mm HE Projectile	-	-
	1	57-mm HE Projectile	-	-
	1	20-mm HE Round	-	-
11/8/2001	1	Booster Assembly for 5-inch Projectile	2	20-mm casing with primer/powder
	2	20-mm HE Rounds	2	50-cal Ball Round
	1	20-mm HE Projectile	2	50-cal casing with primer/powder
11/14/2001	1	20-mm HE Round	-	-
	1	Fuze, PD	-	-
	1	Unk Ordnance component	-	-
11/19/2001	2	90-mm HE AP	5	50-cal Ball Round
	1	5-inch HE Projectile N/B fuze	4	20-mm casing with primer/powder
	1	20-mm HE Round	2	50-cal casing with primer/powder
	3	Baggies of unidentified components	-	-
11/20/2001	1	5-inch HE Projectile	-	-
	1	3-inch HE Projectile	-	-
	1	5-inch HE Rocket Warhead in container	-	-
	1	5-inch Rocket Motor	-	-

TABLE 4-2

ORDNANCE INVENTORY AND ACCOUNTABILITY LOG

High Explosive OE Items Placed in Magazine Number 823 (Rated 1.1d)			Other OE Items Placed in Magazine Number 84 (Rated 1.3d)	
Date Discovered and Removed	**Quantity**	**Item Description**	**Quantity**	**Item Description**
11/26/2001	1	90-mm HE AP Projectile	1	1.1-inch casing with powder
	1	76-mm HE Round with VT Fuze	6	20-mm casing with primer/powder
	2	40-mm HE Round	4	50-cal casing with primer/powder
	3	PD Nose Fuzes	2	50-cal Ball Round
	5	20-mm HE Rounds	-	-
	1	40-mm HE Projectile	-	-
11/27/2001	2	40-mm HE Rounds	20	50-cal Ball Round
	4	PD Nose Fuzes	3	20-mm casing with primer/powder
12/4/2001	3	PD Nose Fuzes	2	50-cal Ball Round
	1	Practice Bomb MK23	5	20-mm casing with primer/powder
12/5/2001	1	20-mm HE Projectile	-	-
12/6/2001	1	PD Nose Fuzes	-	-
12/10/2001	1	37-mm HE Projectile	-	-
12/11/2001	1	20-mm HE Round	-	-
12/12/2001	1	Grenade, Hand, MKII	-	-
	2	Practice Bomb MK23	-	-
12/17/2001	1	Practice Bomb MK23	-	-
12/18/2001	1	Practice Bomb MK23	1	50-cal Ball Round
12/20/2001	2	20-mm HE Rounds	2	2.25-mm Rocket Ogive No Hazard
	1	37-mm HE Projectile	4	50-cal Round
	2	Unidentified Nose Fuze	3	50-cal casing with primer/powder
	1	3-inch HE Projectile	2	20-mm casing with primer/powder
	2	PD Nose Fuzes	-	-
	1	40-mm HE Projectile	-	-
	1	1.1-inch Projectile	-	-
1/4/2002	7	40-mm HE Projectile	7	50-cal Ball Round
	4	PD Nose Fuzes	9	50-cal casing with primer/powder
	2	1.1-inch Rounds	1	1.1-inch casing with powder
	5	20-mm Rounds	8	20-mm casing with primer/powder
	1	20-mm Projectile	-	-
	1	MKII Hand Grenade	-	-
	1	90-mm HE AP Projectile	-	-
1/7/2002	1	PD Nose Fuzes, 60-mm Mortar	9	20-mm casing with primer/powder
	1	20-mm HE Projectile	1	1.1-inch casing with powder
			4	50-cal casing with primer/powder
1/8/2002	1	1-lb HE Projectile	-	-
	1	3-lb HE Projectile	-	-
	1	20-mm Rounds	-	-
1/10/2002	4	1-lb HE Projectile	8	50-cal casing with primer/powder
	1	20-mm HE Round	-	-
	2	Practice Bomb MK23	-	-
1/14/2002	1	Practice Bomb MK23	-	-
	1	20-mm HE Projectile	-	-
1/15/2002	2	Practice Bomb MK23	-	-
	2	1-lb HE Projectile	-	-
1/16/2002	3	PD Nose Fuzes	-	-
	2	Practice Bomb MK23	-	-
	1	Base Fuze	-	-
1/17/2002	2	PD Nose Fuzes	-	-
1/24/2002	1	1.1-inch Projectile	-	-
1/25/2002	2	PD Nose Fuzes	-	-
	3	Base Fuze	-	-
	3	Fuze Components	-	-
	1	5-inch Rocket Motor	-	-
	7	20-mm HE Projectile	-	-
1/29/2002	1	PD Fuze Unk	-	-
	1	Marine Marker Type Unk	-	-
2/1/2002	1	1.1-inch HE Round	-	-
2/4/2002	2	20-mm HE Rounds	-	-

TABLE 4-2

ORDNANCE INVENTORY AND ACCOUNTABILITY LOG

High Explosive OE Items Placed in Magazine Number 823 (Rated 1.1d)			Other OE Items Placed in Magazine Number 84 (Rated 1.3d)	
Date Discovered and Removed	**Quantity**	**Item Description**	**Quantity**	**Item Description**
2/5/2002	1	PD Nose Fuze	-	-
2/12/2002	80	Dirt Clods Small 0-40-mm	-	-
	44	Dirt Clods Med 57-60-mm	-	-
	17	Dirt Clods Large above 60-mm	-	-
	95	Dirt Clods Small 0-40-mm	-	-
	35	Dirt Clods Med 57-60-mm	-	-
	4	Dirt Clods Large above 60-mm	-	-
2/13/2002	1	40-mm HE Projectile	-	-
2/14/2002	1	40-mm HE Projectile	-	-
2/19/2002	2	40-mm HE Projectile	1	20 lbs of Pyrotechic Mixture
	1	Base Fuze with Burster	-	-
	2	20-mm HE Projectile	-	-
2/21/2002	1	1.1-inch HE Projectile	-	-
	2	20-mm HE Projectile	-	-
	1	Unk Base Fuze	-	-
2/22/2002	7	20-mm HE Projectile	1	Unk Pyrotechic Mixture (20 lbs)
	3	Point Detonating Nose Fuzes	6	20-mm casing with primer/powder
	1	Mk 23 Practice Bomb	-	-
2/25/2002	3	40-mm HE Projectile	1	Unk Pyrotechic Mixture (10 lbs)
	4	Point Detonating Nose Fuzes	-	-
	2	Base Fuzes	-	-
	19	Unidentified Components	-	-
	10	20-mm HE Projectile	-	-
2/26/2002	1	Point Detonating Nose Fuzes	1	50-cal Ball Round
	5	20-mm HE Projectile	-	-
	2	1.1-inch HE Projectile	-	-
2/27/2002	2	20-mm HE Projectile	-	-
2/28/2002	1	40-mm HE Projectile	1	Unk Pyrotechnic Mixture (15 lbs)
	2	20-mm HE Projectile	-	-
	1	20-mm HE Rounds	-	-
3/1/2002	4	20-mm HE Projectile	-	-
	1	Unk Component	-	-
3/4/2002	1	20-mm HE Projectile	4	50-cal Round
	1	20-mm HE Rounds	1	Unk Pyrotechic Mixture (15 lbs)
3/5/2002	5	20-mm HE Projectile	3	50-cal Round
	2	40-mm HE Projectile	1	Unk Pyrotechic Mixture (10 lbs)
	1	Practice Bomb MK23	-	-
	1	Unk Fuze	-	-
3/6/2002	5	20-mm HE Projectile	1	Unk Pyrotechnic Mixture (10 lbs)
	2	20-mm HE Rounds	-	-
	2	Point Detonating Nose Fuzes	-	-
	1	100 series Bomb Fuze	-	-
3/7/2002	2	40-mm HE Projectile	1	Unk Pyrotechnic Mixture (30 lbs)
	3	20-mm HE Projectile	-	-
	2	Point Detonating Nose Fuzes	-	-
3/11/2002	1	5-inch Projectile	1	5-inch casing with primer/powder
	1	40-mm HE Round	1	Unk Pyrotechnic Mixture (15 lbs)
	3	20-mm HE Projectile	-	-
	1	Point Detonating Nose Fuzes	-	-
	1	37-mm AP HE Projectile	-	-
3/12/2002	2	40-mm HE Projectile	1	Unk Pyrotechnic Mixture (3 lbs)
	2	20-mm HE Projectile	-	-
	7	20-mm Rounds	-	-
	2	Point Detonating Nose Fuzes	-	-
	1	Partial Fuze	-	-
	1	Unk Pojectile	-	-
3/13/2002	1	1.1-inch HE Round	1	50-cal Round
	2	20-mm HE Projectile	1	Unk Pyrotechnic Mixture (1 lb)
	1	Point Detonating Nose Fuzes	-	-

TABLE 4-2

ORDNANCE INVENTORY AND ACCOUNTABILITY LOG

High Explosive OE Items Placed in Magazine Number 823 (Rated 1.1d)			Other OE Items Placed in Magazine Number 84 (Rated 1.3d)	
Date Discovered and Removed	**Quantity**	**Item Description**	**Quantity**	**Item Description**
3/14/2002	16	40-mm HE AA Rounds	1	50-cal Round
	1	Unk Fuze	1	Unk Pyrotechic Mixture (1 lb)
	1	20-mm Rounds	-	-
	2	20-mm HE Projectile	-	-
3/15/2002	1	20-mm HE Rounds	1	50-cal Round
	2	20-mm HE Projectile	-	-
	1	Point Detonating Nose Fuzes	-	-
3/18/2002	10	40-mm HE Rounds	-	-
	1	Unk Fuze	-	-
	13	40-mm HE Projectiles (Disposed by Navy EOD)	-	-
3/19/2002	7	40-mm HE Rounds	-	-
	8	40-mm HE Projectiles	-	-
	1	3-inch Projectile	-	-
	1	Unk Fuze	-	-
	1	20-mm Rounds	-	-
	1	Bulk Explosives 1/4 lbs	-	-
3/20/2002	2	20-mm HE Rounds	1	40-mm casing with powder
	1	20-mm HE Projectile	1	50-cal Round
	1	60-mm HE Mortar w/Fuze	-	-
3/21/2002	1	20-mm HE Rounds	1	50-cal Round
	1	40-mm HE Round	-	-
3/22/2002	2	Point Detonating Nose Fuzes	-	-
	1	20-mm HE Projectile	-	-
3/25/2002	-	-	1	7.62 Round
	-	-	1	50-cal Round
	-	-	10	Unk blank rounds
3/26/2002	1	40-mm HE Projectile	-	-
4/1/2002	1	40-mm HE Projectile	-	-
9/19/2001 through 4/1/2002	-	-	**275**	**Other suspect items (OE type unknown)**
Total Number of Items Discovered and Rendered Inert				
	743		**615**	

Notes:

AA: anti-aircraft
AP: armor piercing
APT: armor piercing tracer
cal: caliber
EOD: explosive and ordnance disposal
HE: high explosive
lb: pound
mm: millimeter
PD: probability of detection
Unk: unknown

TABLE 4-3

SUMMARY OF STOCKPILE SOIL SAMPLE ANALYTICAL TEST RESULTS FOR TAL METALS

Sample Number			0023-001	0023-002	0023-003	0023-004	0023-005	0023-006	0023-007	0023-008	0023-011	0023-012	0023-013	0023-014	0023-015	0023-016	0023-017	0023-018
Stockpile Designation/Location			C1	C1	C1	C1	C1	C1	C1	C1	C2	C2	C2	C2	C2	C2	C2	C2
Sample Date			10/9/2001	10/9/2001	10/17/2001	10/17/2001	10/17/2001	10/17/2001	10/17/2001	10/17/2001	10/30/2001	10/30/2001	10/30/2001	10/30/2001	10/30/2001	10/30/2001	10/30/2001	10/30/2001
Analyte	Units	TTLC*																
Metals (EPA Method 6010B/7000)																		
ANTIMONY	mg/kg	500	5.4 U	5.4 U	5.3 U	5.3 U	5.3 U	5.4 U	5.3 U	5.3 U	5.3 U	5.3 U	5.4 U	5.6 U	5.8 U	5.3 U	5.4 U	5.4 U
ARSENIC	mg/kg	500	2.3	2.6	3.5	3.2	2.6	2.2	2	2.4	2.8	2.8	3	3.1	3.4	2.9	5.5	5.6
BARIUM	mg/kg	10000	35.6	48.3	50.3	49.6	37	30.7	34.7	33.6	52.6	48.6	47.2	44.9	43.2	41.8	65.8	67.4
BERYLLIUM	mg/kg	75	0.22 U	0.21 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.21 U	0.21 U	0.21 U	0.22 U	0.22 U	0.23 U	0.21 U	0.22 U	0.22 U
CADMIUM	mg/kg	100	0.019 J	0.098 J	0.14 J	0.12 J	0.054 J	0.1 J	0.032 J	0.027 J	0.081 J	0.087 J	0.052 J	0.048 J	0.096 J	0.075 J	0.46	0.47
CHROMIUM	mg/kg	2500	11.7	12	21.4	23.9	20.5	8.6	9.6	17.7	13.8	14.1	12.6	12.6	14.1	11.2	18.1	20.1
COBALT	mg/kg	8000	4.6	5.2	5.3	4.8	4	4.1	4.4	4.6	6.4	6.3	5.9	6.5	7.2	5.7	7.9	8
COPPER	mg/kg	2500	11.6	12.6	17.1	15.8	11.5	10.5	11.2	12.3	16.4	16.3	14	17.2	16.4	13.7	22.7	50.3
LEAD	mg/kg	1000	40.5	32.5	159	192	44.5	14	19.7	35.3	21.6	20.7	26.7	17	16.7	16.6	58.7	64.1
MERCURY	mg/kg	20	0.22 J	0.99	0.11 J	0.094 J	0.15 J	0.095 J	0.086 J	0.038 J	0.1 J	0.079 J	0.082 J	0.11 J	0.083 J	0.071 J	0.086 J	0.081 J
MOLYBDENUM	mg/kg	3500	0.22 U	0.21 U	0.083 J	0.066 J	0.21 U	0.22 U	0.21 U	0.21 U	0.21 U	0.072 J	0.22 U	0.22 U	0.23 U	0.21 U	0.22 U	0.22 U
NICKEL	mg/kg	2000	7.7	8.6	9.1	7.8	6.3	6.9	7.4	8.2	9.6	9.5	8.7	9.3	11.3	7.6	13.9	13.3
SELENIUM	mg/kg	100	0.54 U	0.15 J	0.53 U	0.53 U	0.53 U	0.54 U	0.53 U	0.53 U	0.53 U	0.53 U	0.32 J	0.56 U	0.58 U	0.53 U	0.54 U	0.54 U
SILVER	mg/kg	500	0.061 J	0.086 J	0.085 J	0.06 J	0.53 U	0.077 J	0.047 J	0.53 U	0.53 U	0.53 U	0.54 U	0.56 U	0.58 U	0.53 U	0.54 U	0.54 U
THALLIUM	mg/kg	700	0.54 U	0.54 U	0.53 U	0.53 U	0.53 U	0.54 U	0.53 U	0.53 U	0.53 U	0.53 U	0.54 U	0.56 U	0.58 U	0.53 U	0.54 U	0.54 U
VANADIUM	mg/kg	2400	21.2	22.9	21.5	18	14.8	18.9	20.5	20.8	27.7	29.1	25.5	28.4	29.5	25.9	32.4	34
ZINC	mg/kg	5000	60.9	63	173	173	79.6	41.2	46.8	64.7	69.8	62.7	67.3	72.8	64.1	53.8	91.4	118
STLC CHROMIUM	µg/L	5000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STLC COPPER	µg/L	25000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STLC LEAD	µg/L	5000	NA	NA	6570	4570	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1680	2450
STLC ZINC	µg/L	250000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCLP CHROMIUM	µg/L	5000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCLP LEAD	µg/L	5000	NA	NA	459	833	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-3

SUMMARY OF STOCKPILE SOIL SAMPLE ANALYTICAL TEST RESULTS FOR TAL METALS

Sample Number			0023-027	0023-028	0023-029	0023-030	0023-031	0023-032	0023-033	0023-034	0023-035	0023-036	0023-037	0023-040	0023-041	0023-043	0023-046	0023-048
Stockpile Designation/Location			D1	D1	D1	D1	D1	D1	D1	D1	D1	D1	D2	D2	D2	C3	C3	D2
Sample Date			11/7/2001	11/7/2001	11/7/2001	11/7/2001	11/7/2001	11/7/2001	11/7/2001	11/7/2001	11/7/2001	11/7/2001	11/15/2001	11/15/2001	11/15/2001	11/26/2001	11/26/2001	12/3/2001
Analyte	Units	TTLC*																
Metals (EPA Method 6010B/7000)																		
ANTIMONY	mg/kg	500	0 26 J	0 44 J	5 5 U	5 2 U	5 4 U	21 6	1 9 J	0 8 J	5 1 U	0 47 J	5 6 U	5 5 U	5 4 U	5 6 U	1 9 J	1 8 J
ARSENIC	mg/kg	500	4 7	3 7	4 2	4	3 8	5 9	3 9	6 1	3 7	4	5 5	3 9	4 5	6 6	4 8	4 8
BARIUM	mg/kg	10000	75 8	75	88 6	71 2	84	92 3	58 4	79	54 3	64 8	113	80 7	91 8	99 5	140	78 5
BERYLLIUM	mg/kg	75	0 21 U	0 22 U	0 22 U	0 21 U	0 22 U	0 22 U	0 22 U	0 22 U	0 2 U	0 22 U	0 22 U	0 22 U	0 22 U	2 6	0 22 U	0 22 U
CADMIUM	mg/kg	100	0 56	0 15 J	0 18 J	0 42	0 51	0 45	0 41	0 49	0 099 J	0 22 J	0 86	0 48	0 42	1	0 77	1
CHROMIUM	mg/kg	2500	21 5	17 7	20	18 3	30 3	26 1	16 8	48 3	15 3	24 2	26 5	19 5	23	29 4	22 7	20 7
COBALT	mg/kg	8000	6 8	7 1	7 2	6 7	7 3	8 1	5 9	7 2	5 6	6 7	8 4	7 3	8	10.8	9	9 7
COPPER	mg/kg	2500	38 2	39 9	26	33 6	52 3	88	31 4	98 1	36 4	42 8	97 1	43 8	55 8	3490	137	43
LEAD	mg/kg	1000	61 8	51	62 5	49 4	89 5	1660	104	234	80	156	110	61 6	77	358	180	65 4
MERCURY	mg/kg	20	0 1 J	0 062 J	0 082 J	0 069 J	0 085 J	0 1 J	0 064 J	0 076 J	0 03 J	0 075 J	0 13 J	0 13 J	0 23	0 081 J	0 12 J	0 07 J
MOLYBDENUM	mg/kg	3500	0 24	0 22 U	0 22 U	0 21 U	0 22 U	0 052 J	0 22 U	1 9	0 2 U	0 22 U	0 071 J	0 22 U	0 22 U	0 97	0 38	0 22 U
NICKEL	mg/kg	2000	12 4	12 4	11 9	11 5	12 5	17 6	11	19	10 4	13 4	18 5	12 8	14 7	23 8	16 9	16
SELENIUM	mg/kg	100	0 53 U	0 54 U	0 52 J	0 52 U	0 37 J	0 55 U	0 19 J	0 67	0 51 U	0 31 J	0 71	0 26 J	0 52 J	0 51 J	0 56 U	0 23 J
SILVER	mg/kg	500	0 08 J	0 17 J	0 072 J	0 13 J	0 15 J	0 11 J	0 54 U	0 14 J	0 51 U	0 55 U	0 65	0 18 J	0 26 J	0 4 J	0 15 J	0 55 U
THALLIUM	mg/kg	700	0 53 U	0 54 U	0 55 U	0 52 U	0 54 U	0 55 U	0 54 U	0 56 U	0 51 U	0 55 U	0 56 U	0 55 U	0 54 U	0 56 U	0 56 U	0 55 U
VANADIUM	mg/kg	2400	30 1	33 3	31 4	28 5	31 8	32 5	26 7	32 9	26 8	31 5	33 9	30 7	36 3	36 1	35 6	34 1
ZINC	mg/kg	5000	178	133	121	141	174	456	157	342	106	161	313	159	257	655	338	155
STLC CHROMIUM	µg/L	5000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STLC COPPER	µg/L	25000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
STLC LEAD	µg/L	5000	2130	10 J	1520	2490	2290	NA	6620	14500	5420	5670	5050	10800	5840	3640	5300	2140
STLC ZINC	µg/L	250000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCLP CHROMIUM	µg/L	5000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCLP LEAD	µg/L	5000	NA	NA	NA	NA	NA	297	78	215	NA	258	37.4	NA	NA	37.2	67.7	NA

TABLE 4-3

SUMMARY OF STOCKPILE SOIL SAMPLE ANALYTICAL TEST RESULTS FOR TAL METALS

Sample Number			0023-049	0023-050	0023-051	0023-052	0023-054	0023-055	0023-056	0023-057	0023-058	0023-059	0023-060	0023-061	0023-062	0023-065	0023-066	0023-067
Stockpile Designation/Location			D2	C3	C3	C3	C3	D3	D3	D3	D3	D3	D3	D3	D3	C4	C4	C4
Sample Date			12/3/2001	12/4/2001	12/4/2001	12/4/2001	12/4/2001	12/11/2001	12/11/2001	12/11/2001	12/11/2001	12/11/2001	12/11/2001	12/12/2001	12/12/2001	12/18/2001	12/18/2001	12/18/2001
Analyte	Units	TTLC*																
Metals (EPA Method 6010B/7000)																		
ANTIMONY	mg/kg	500	2 4 J	2 J	1 8 J	2 1 J	3 8 J	1 3 J	5 1 J	4 J	4 9 J	8 2	3 6 J	5 8	6 3	0 24 J	5 5 U	5 6 U
ARSENIC	mg/kg	500	5 1	6 5	4 1	6 1	4 1	10 3	6 2	5 8	5 2	5 4	6 9	9 1	5 7	5 3	6 8	4 5
BARIUM	mg/kg	10000	87 1	120	94 1	120	224	121	184	152	190	153	180	194	197	217	116	110
BERYLLIUM	mg/kg	75	0 22 U	0 22 U	0 22 U	0 22 U	0 22 U	0 23 U	0 23 U	0 23 U	0 23 U	0 23 U	0 24 U	0 23 U	0 23 U	0 22 U	0 22 U	0 22 U
CADMIUM	mg/kg	100	0 54	0 75	0 44	0 7	0 83	0 71	1 9	0 93	1 7	0 98	1 1	1 7	1 4	0 7	0 86	0 82
CHROMIUM	mg/kg	2500	20 1	23 7	17 5	26 8	23 7	128	40 6	42	36 8	49 9	38 6	53 3	41	28 7	32 9	24 8
COBALT	mg/kg	8000	9 2	12	8 3	10 8	9 9	10 2	11 2	10 2	10 3	11 6	11 4	13 3	10 8	10 4	10 8	9 8
COPPER	mg/kg	2500	43 8	44	34 9	270	190	110	167	175	1240	156	155	231	160	30 6	29	30 2
LEAD	mg/kg	1000	54 6	36 4	47 2	113	180	378	340	518	1040	356	291	423	376	53 4	47 7	52 2
MERCURY	mg/kg	20	0 092 J	0 056 J	0 093 J	0 065 J	0 085 J	0 14 J	0 12 J	0 12 J	0 13 J	0 1 J	0 17 J	0 24	0 055 J	0 077 J	0 079 J	0 099 J
MOLYBDENUM	mg/kg	3500	0 22 U	0 46	0 22 U	0 38	0 37	5 3	2 3	1 1	0 73	1 6	1 4	1 9	1 2	0 22 U	0 22 U	0 22 U
NICKEL	mg/kg	2000	13 8	16 8	13 4	17 4	18 3	112	24 3	22 6	23 5	24 5	25 1	33 7	24 9	17	17 3	15 8
SELENIUM	mg/kg	100	0 55 U	0 62	0 54 U	0 41 J	0 69	0 57 U	0 57 U	0 35 J	1 8	0 58 U	0 59 U	0 58 U	0 66	1	0 73	0 27 J
SILVER	mg/kg	500	0 55 U	0 55 U	0 54 U	0 55 U	0 24 J	0 57 U	0 57 U	0 58 U	0 57 U	0 58 U	0 058 J	0 58 U	0 57 U	0 56 U	0 55 U	0 56 U
THALLIUM	mg/kg	700	0 55 U	0 55 U	0 54 U	0 55 U	0 55 U	0 57 U	0 57 U	0 58 U	0 57 U	0 58 U	0 59 U	0 58 U	0 57 U	0 56 U	0 55 U	0 56 U
VANADIUM	mg/kg	2400	32 9	40 4	27 9	37 5	35 7	32 7	41 5	38 8	36	42 5	44 1	46 2	43	39 2	39 9	34 1
ZINC	mg/kg	5000	198	129	123	451	343	609	1380	1010	1720	989	1340	1440	1970	187	242	176
STLC CHROMIUM	µg/L	5000	NA	NA	NA	NA	NA	577	NA	NA	NA	NA	NA	839	NA	NA	NA	NA
STLC COPPER	µg/L	25000	NA	NA	NA	1220	NA	NA	NA	NA	4070	NA	NA	NA	NA	NA	NA	NA
STLC LEAD	µg/L	5000	2360	NA	NA	2340	7030	12100	15600	172000	NA	33900	16200	18700	11000	1260	NA	2800
STLC ZINC	µg/L	250000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCLP CHROMIUM	µg/L	5000	NA	NA	NA	NA	NA	2 6 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCLP LEAD	µg/L	5000	NA	NA	NA	71.2	103	311	226	1250	289	149	96.5	328	310	NA	NA	NA

TABLE 4-3

SUMMARY OF STOCKPILE SOIL SAMPLE ANALYTICAL TEST RESULTS FOR TAL METALS

Sample Number			0023-068	0023-069	0023-070	0023-071	0023-072	0023-073	0023-081	0023-082	0023-083	0023-084	0023-088	0023-089	0023-090	0023-110	0023-111	0023-112
Stockpile Designation/Location			C4	C4	C4	D4	D4	D4	SC1	SC2	SC3	SC4	D5	D5	D5	D6	D6	D6
Sample Date			12/18/2001	12/18/2001	12/18/2001	12/28/2001	12/28/2001	12/28/2001	2/12/2002	2/12/2002	2/12/2002	2/12/2002	3/6/2002	3/6/2002	3/6/2002	3/12/2002	3/12/2002	3/12/2002
Analyte	Units	TTLC*																
Metals (EPA Method 6010B/7000)																		
ANTIMONY	mg/kg	500	0 12 J	0 51 J	0 17 J	1 J	0 71 J	21 9	2 4 J	1 4 J	8	1 1 J	2 2 J	1 9 J	2 1 J	8 7	8 3	11
ARSENIC	mg/kg	500	4 8	4.1	5 5	6 2	7	6 9	9 5	8 6	10.2	6 8	5 5	6 9	7	16	11 1	8 9
BARIUM	mg/kg	10000	106	105	111	123	136	121	182	162	248	147	110	116	124	172	219	151
BERYLLIUM	mg/kg	75	0 22 U	0 22 U	0 22 U	0 23 U	0 23 U	0 22 U	0 26 U	0 26 U	0 26 U	0 25 U	0 22 U	0.23 U	0 22 U	0 24 U	0 24 U	0 22 U
CADMIUM	mg/kg	100	0 72	0 86	1	0 83	0 95	0 81	1 7	0 44	3 2	1	0 73	0 79	0 76	2 1	2 1	2
CHROMIUM	mg/kg	2500	25 5	23 2	27 6	29 9	31 8	31 4	40 8	37 2	60.4	48 7	26 1	28 4	26	47 8	49 2	42 2
COBALT	mg/kg	8000	9 7	8 5	10 6	10 7	11 3	10 2	13 2	12 5	12 5	11 5	9 4	10 4	10 9	13 7	14 9	12
COPPER	mg/kg	2500	30 9	40 8	42 1	240	325	107	177	69 4	203	98 2	104	103	94 9	719	286	3380
LEAD	mg/kg	1000	45 2	56 1	88 4	195	186	186	256	109	468	189	144	132	100	354	346	297
MERCURY	mg/kg	20	0 092 J	0 072 J	0 079 J	0 18 J	0 13 J	0 085 J	0 14 J	0 088 J	0 29	0 11 J	0 11 J	0 13 J	0 14 J	0 16 J	0 2 J	0 18 J
MOLYBDENUM	mg/kg	3500	0 22 U	0 32	0 22 U	0 3	0 23 U	0 35	3 2	2 6	1 3	0 6	0 32	0 58	0 89	1 9	1 6	1 2
NICKEL	mg/kg	2000	15 9	14 3	17 5	21 5	22	22 4	109	23 2	30.1	23 2	17 6	21 9	24 1	31 1	33.7	25 9
SELENIUM	mg/kg	100	0 75	0 28 J	0 38 J	0 36 J	0 29 J	0 56 U	0 65 U	0 4 J	0 64 U	0 32 J	0 54 U	0 56 U	0 56 U	0 88	0 46 J	0 66
SILVER	mg/kg	500	0 56 U	0 55 U	0 55 U	0 22 J	0 23 J	0 26 J	0 1 J	0 66 U	0 97	0 12 J	0 51 J	0 61	0 58	0 11 J	0 33 J	0 075 J
THALLIUM	mg/kg	700	0 56 U	0 55 U	0 55 U	0 57 U	0 57 U	0 56 U	0 65 U	0 66 U	0 64 U	0 63 U	0 54 U	0 56 U	0 56 U	0 6 U	0 6 U	0 55 U
VANADIUM	mg/kg	2400	35 9	30.4	38 7	40 5	41 2	38 4	42 7	50 6	41 3	48 7	34 7	38 1	38 2	40.8	48 9	39 2
ZINC	mg/kg	5000	220	203	320	569	649	443	777	390	1520	2990	341	393	439	1430	1160	2180
STLC CHROMIUM	µg/L	5000	NA	NA	NA	NA	NA	NA	NA	NA	1110	NA	NA	NA	NA	NA	NA	NA
STLC COPPER	µg/L	25000	NA	NA	NA	NA	4810	NA	NA	NA	NA	NA	NA	NA	NA	4410	677	NA
STLC LEAD	µg/L	5000	NA	2330	2100	8890	9480	7000	8400	3880	5240	5750	6370	5420	6740	21300	16000	12800
STLC ZINC	µg/L	250000	NA	NA	NA	NA	NA	NA	NA	NA	NA	38900	NA	NA	NA	NA	NA	NA
TCLP CHROMIUM	µg/L	5000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCLP LEAD	µg/L	5000	NA	NA	NA	124	265	131	131	132	270	1100	129	74	37.1	198	410	360

TABLE 4-3

SUMMARY OF STOCKPILE SOIL SAMPLE ANALYTICAL TEST RESULTS FOR TAL METALS

Sample Number			0023-113	0023-114	0023-115	0023-115 **	0023-116	0023-117	0023-118	0023-119	0023-120	0023-121	0023-122
Stockpile Designation/Location			D6	D6	D6	D6	D6	D6	D6	D6	D6	D6	D6
Sample Date			3/12/2002	3/12/2002	3/12/2002	3/12/2002	3/12/2002	3/12/2002	3/25/2002	3/25/2002	3/25/2002	3/25/2002	3/25/2002
Analyte	Units	TTLC*											
Metals (EPA Method 6010B/7000)													
ANTIMONY	mg/kg	500	7 2	7 3	20 8	NA	9 9	6 9	NA	NA	NA	NA	NA
ARSENIC	mg/kg	500	9 7	10 9	14 7	NA	11 3	9 5	NA	NA	NA	NA	NA
BARIUM	mg/kg	10000	173	165	164	NA	176	194	134	184	455	114	174
BERYLLIUM	mg/kg	75	0 24 U	0 23 U	0 23 U	NA	0 23 U	0 24 U	NA	NA	NA	NA	NA
CADMIUM	mg/kg	100	1 9	1 7	2 6	NA	1 7	2 1	NA	NA	NA	NA	NA
CHROMIUM	mg/kg	2500	49 8	46 1	47 6	NA	51	49 3	24 2	40 5	38 1	29 5	39 6
COBALT	mg/kg	8000	13	13 3	13 9	NA	13 5	13 6	NA	NA	NA	NA	NA
COPPER	mg/kg	2500	209	252	260	NA	170	191	124	181	262	279	218
LEAD	mg/kg	1000	320	449	1880	NA	310	335	175	294	455	921	492
MERCURY	mg/kg	20	0 19 J	0 26	0 15 J	NA	0 14 J	0 24	NA	NA	NA	NA	NA
MOLYBDENUM	mg/kg	3500	1 6	1 7	3 5	NA	1 9	1 1	NA	NA	NA	NA	NA
NICKEL	mg/kg	2000	30 1	29 7	37 6	NA	37 7	34 1	NA	NA	NA	NA	NA
SELENIUM	mg/kg	100	0 6 U	0 58	0 89	NA	0 49 J	1 2	NA	NA	NA	NA	NA
SILVER	mg/kg	500	0 036 J	0 029 J	0 057 J	NA	0 58 U	0 6 U	NA	NA	NA	NA	NA
THALLIUM	mg/kg	700	0 6 U	0 57 U	0 58 U	NA	0 58 U	0 6 U	NA	NA	NA	NA	NA
VANADIUM	mg/kg	2400	40 7	43 4	41 8	NA	43 6	46 3	NA	NA	NA	NA	NA
ZINC	mg/kg	5000	1150	1140	1180	NA	984	1030	540	902	3890	1770	1140
STLC CHROMIUM	µg/L	5000	NA	NA	NA	NA	951	NA	NA	NA	NA	NA	NA
STLC COPPER	µg/L	25000	NA	146	556	NA	NA	NA	NA	NA	NA	NA	NA
STLC LEAD	µg/L	5000	26800	17200	NA	NA	12200	177000	32400	44900	15400	17100	19300
STLC ZINC	µg/L	250000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCLP CHROMIUM	µg/L	5000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCLP LEAD	µg/L	5000	219	191	54800	1240	463	473	126	507	340	399	306

TABLE 4-4

SUMMARY OF STOCKPILE SOIL SAMPLE ANALYTICAL TEST RESULTS FOR PCBs, VOCs, AND SVOCs

Sample Number		0023-001	0023-002	0023-003	0023-004	0023-006	0023-008	0023-011	0023-013	0023-017	0023-027	0023-030	0023-034	0023-041	0023-043	0023-055	0023-058	0023-061	0023-065	0023-068	0023-071	0023-081	0023-089	0023-110	0023-113	0023-116
Stockpile Designation/Location		C1	C1	C1	C1	C1	C1	C2	C2	C2	D1	D1	D1	D2	C3	D3	D3	D3	C4	C4	D4	SC1	D5	D6	D6	D6
Date Sample Collected		10/9/2001	10/9/2001	10/17/2001	10/17/2001	10/17/2001	10/17/2001	10/30/2001	10/30/2001	10/30/2001	11/7/2001	11/7/2001	11/7/2001	11/15/2001	11/26/2001	12/11/2001	12/11/2001	12/12/2001	12/18/2001	12/18/2001	12/28/2001	2/12/2002	3/6/2002	3/12/2002	3/12/2002	3/12/2002
Analyte	Units																									
PCBs (EPA Method 8082)																										
AROCLOR 1016	µg/kg	54 U	54 U	NA	53 U	NA	NA	53 U	54 U	54 U	53 U	52 U	56 U	54 U	56 U	57 U	57 U	58 U	37 U	37 U	57 U	65 U	56 U	60 U	60 U	58 U
AROCLOR 1221	µg/kg	110 U	110 U	NA	110 U	NA	NA	110 U	110 U	110 U	110 U	100 U	110 U	110 U	110 U	110 U	110 U	120 U	73 U	73 U	110 U	130 U	110 U	120 U	120 U	120 U
AROCLOR 1232	µg/kg	54 U	54 U	NA	53 U	NA	NA	53 U	54 U	54 U	53 U	52 U	56 U	54 U	56 U	57 U	57 U	58 U	37 U	37 U	57 U	65 U	56 U	60 U	60 U	58 U
AROCLOR 1242	µg/kg	54 U	54 U	NA	53 U	NA	NA	53 U	54 U	54 U	53 U	52 U	56 U	54 U	56 U	57 U	57 U	58 U	37 U	37 U	57 U	65 U	56 U	60 U	60 U	58 U
AROCLOR 1248	µg/kg	54 U	54 U	NA	53 U	NA	NA	53 U	54 U	54 U	53 U	52 U	56 U	54 U	56 U	57 U	57 U	58 U	37 U	37 U	57 U	65 U	56 U	60 U	60 U	58 U
AROCLOR 1254	µg/kg	27 U	27 U	NA	27 U	NA	NA	27 U	27 U	210	27 U	26 U	28 U	27 U	28 U	35	11 J	9 J	37 U	37 U	39	32 U	28 U	30 U	30 U	29 U
AROCLOR 1260	µg/kg	5 J	5 J	NA	5 J	NA	NA	27 U	27 U	27 U	67	88	13 J	42	31 J	28 U	29 U	29 U	27 J	21 J	19 J	7 J	21 J	20 J	24 J	14 J
VOCs (EPA Method 8260B)																										
ACETONE	µg/kg	7 J	NA	49 U	NA	NA	NA	51 U	51 U	50 U	70 U	53 U	52 U	15 J	61 U	47 U	54 U	19 J	73 U	67 U	60 U	62 U	55 U	84 U	18 J	16 J
BENZENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
BROMODICHLOROMETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
BROMOFORM	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
BROMOMETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
CARBON TETRACHLORIDE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
CHLOROBENZENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
CHLOROETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
CHLOROFORM	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
CHLOROMETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
DIBROMOCHLOROMETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
1 1-DICHLOROETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
1 2-DICHLOROETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
1 1-DICHLOROETHENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
CIS-1 2-DICHLOROETHENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	72	67	13	1 J	0.8 J	5 J	2 J	5.5 U	2 J	0.6 J	1 J
TRANS-1 2-DICHLOROETHENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	13	10	5	7.3 U	6.7 U	9	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
1 2-DICHLOROPROPANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
CIS-1 3-DICHLOROPROPENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
TRANS-1 3-DICHLOROPROPENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
ETHYLBENZENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
2-HEXANONE	µg/kg	98 U	NA	2 J	NA	NA	NA	0.9 J	51 U	50 U	70 U	53 U	52 U	0.9 J	61 U	47 U	54 U	49 U	73 U	67 U	60 U	62 U	55 U	84 U	53 U	52 U
METHYL ETHYL KETONE(MEK)	µg/kg	6 J	NA	17 J	NA	NA	NA	4 J	51 U	50 U	70 U	53 U	52 U	52 U	61 U	47 U	54 U	49 U	73 U	67 U	60 U	62 U	55 U	84 U	53 U	52 U
METHYL ISOBUTYL KETONE (MIBK)	µg/kg	98 U	NA	49 U	NA	NA	NA	51 U	51 U	50 U	70 U	53 U	52 U	52 U	61 U	47 U	54 U	49 U	73 U	67 U	60 U	62 U	55 U	84 U	53 U	52 U
METHYL TERT-BUTYL ETHER	µg/kg	20 U	NA	9.7 U	NA	NA	NA	10 U	10 U	9.9 U	14 U	11 U	10 U	10 U	12 U	9.4 U	11 U	9.7 U	15 U	13 U	12 U	12 U	11 U	17 U	11 U	10 U
METHYLENE CHLORIDE	µg/kg	4 J	NA	0.6 J	NA	NA	NA	3 J	3 J	2 J	4 J	3 J	3 J	3 J	4 J	1 J	0.9 J	1 J	16	9	3 J	2 J	4 J	0.9 J	0.9 J	0.5 J
STYRENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
1 1 2 2-TETRACHLOROETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	0.9 J
1 1 1 2-TETRACHLOROETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
TETRACHLOROETHENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	54	110	10	7.3 U	0.8 J	4 J	5 J	2 J	10	3 J	8
TOLUENE	µg/kg	1 J	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
1 1 2-TRICHLOROETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
1 1 1-TRICHLOROETHANE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
TRICHLOROETHENE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	8	3 J	3 J	7.3 U	6.7 U	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
VINYL ACETATE	µg/kg	98 U	NA	49 U	NA	NA	NA	51 U	51 U	50 U	70 U	53 U	52 U	52 U	61 U	47 U	54 U	49 U	73 U	67 U	60 U	62 U	55 U	84 U	53 U	52 U
VINYL CHLORIDE	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	24	54	11	7.3 U	6.7 U	6 U	8	5.5 U	8.4 U	5.3 U	5.2 U
XYLENES (TOTAL)	µg/kg	9.8 U	NA	4.9 U	NA	NA	NA	5.1 U	5.1 U	5 U	7 U	5.3 U	5.2 U	5.2 U	6.1 U	4.7 U	5.4 U	4.9 U	0.9 J	0.9 J	6 U	6.2 U	5.5 U	8.4 U	5.3 U	5.2 U
SVOCs (EPA Method 8270C)																										
ACENAPHTHENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	210 J	180 J	170 J
ACENAPHTHYLENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
ANTHRACENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	1400 U	700 U	130 J	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	280 J	1600 U	1500 U
BENZ[A]ANTHRACENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	220 J	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	110 J	1700 U	1500 U	290 J	240 J	150 J
BENZO[A]PYRENE	µg/kg	1400 U	1400 U	NA	95 J	710 U	710 U	710 U	720 U	610 J	160 J	170 J	730 U	1400 U	1500 U	370 U	380 U	54 J	1500 U	270 J	760 U	1700 U	1500 U	260 J	390 J	140 J
BENZO[B]FLUORANTHENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	110 J	720 U	480 J	150 J	160 J	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
BENZO[G H I]PERYLENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
BENZO[K]FLUORANTHENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	1400 U	240 J	310 J	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	430 J	1600 U	1600 U	1500 U
BIS(2-CHLOROETHOXY) METHANE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
BIS(2-CHLOROETHYL) ETHER	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
BIS(2-CHLOROISOPROPYL) ETHER	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U

TABLE 4-4

SUMMARY OF STOCKPILE SOIL SAMPLE ANALYTICAL TEST RESULTS FOR PCBs, VOCs, AND SVOCs

Sample Number		0023-001	0023-002	0023-003	0023-004	0023-006	0023-008	0023-011	0023-013	0023-017	0023-027	0023-030	0023-034	0023-041	0023-043	0023-055	0023-058	0023-061	0023-065	0023-068	0023-071	0023-081	0023-089	0023-110	0023-113	0023-116
Stockpile Designation/Location		C1	C1	C1	C1	C1	C1	C2	C2	C2	D1	D1	D1	D2	C3	D3	D3	D3	C4	C4	D4	SC1	D5	D6	D6	D6
Date Sample Collected		10/9/2001	10/9/2001	10/17/2001	10/17/2001	10/17/2001	10/17/2001	10/30/2001	10/30/2001	10/30/2001	11/7/2001	11/7/2001	11/7/2001	11/15/2001	11/26/2001	12/11/2001	12/11/2001	12/12/2001	12/18/2001	12/18/2001	12/28/2001	2/12/2002	3/6/2002	3/12/2002	3/12/2002	3/12/2002
Analyte	Units																									
BIS(2-ETHYLHEXYL) PHTHALATE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	280 J	1700 U	1500 U	84 J	89 J	1500 U
4-BROMOPHENYL-PHENYL ETHER	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
4-CHLORO-3-METHYLPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
4-CHLOROANILINE	µg/kg	NA	NA	NA	NA	NA	NA	1600 U	1600 U	3300 U	1600 U	1600 U	1700 U	3300 U	3400 U	860 U	870 U	880 U	3400 U	3400 U	1700 U	3900 U	3400 U	3600 U	3600 U	3500 U
2-CHLORONAPHTHALENE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
2-CHLOROPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
4-CHLOROPHENYL-PHENYL ETHER	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
CHRYSENE	µg/kg	1400 U	1400 U	NA	160 J	710 U	710 U	230 J	200 J	680 J	300 J	360 J	96 J	1400 U	1500 U	120 J	140 J	170 J	520 J	580 J	120 J	260 J	420 J	350 J	320 J	150 J
DIBENZ(A H)ANTHRACENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
DIBENZOFURAN	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
1 2-DICHLOROBENZENE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
1 3-DICHLOROBENZENE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
1 4-DICHLOROBENZENE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	180 J	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
3 3-DICHLOROBENZIDINE	µg/kg	NA	NA	NA	NA	NA	NA	1400 U	1400 U	2800 U	1400 U	1400 U	1500 U	2800 U	2900 U	750 U	750 U	760 U	2900 U	2900 U	1500 U	3400 U	3000 U	3200 U	3100 U	3100 U
2 4-DICHLOROPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
DIETHYL PHTHALATE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
DIMETHYL PHTHALATE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
2 4-DIMETHYLPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
DI-N-BUTYL PHTHALATE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
4 6-DINITRO-2-METHYLPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	3400 U	3500 U	6900 U	3400 U	3300 U	3600 U	6900 U	7100 U	1800 U	1800 U	1900 U	7100 U	7100 U	3700 U	8300 U	7200 U	7700 U	7600 U	7400 U
2 4-DINITROPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	3400 U	3500 U	6900 U	3400 U	3300 U	3600 U	6900 U	7100 U	1800 U	1800 U	1900 U	7100 U	7100 U	3700 U	8300 U	11000 U	7700 U	7600 U	7400 U
2 4-DINITROTOLUENE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
2 6-DINITROTOLUENE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
DI-N-OCTYLPHTHALATE (DOP)	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	150 J	1500 U
FLUORANTHENE	µg/kg	1400 U	1400 U	NA	100 J	710 U	710 U	710 U	720 U	670 J	190 J	310 J	74 J	1400 U	410 J	100 J	120 J	140 J	350 J	330 J	170 J	270 J	1500 U	990 J	560 J	410 J
FLUORENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	210 J	140 J	120 J
HEXACHLOROBENZENE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
HEXACHLOROBUTADIENE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
HEXACHLOROCYCLOPENTADIENE	µg/kg	NA	NA	NA	NA	NA	NA	3400 U	3500 U	6900 U	3400 U	3300 U	3600 U	6900 U	7100 U	1800 U	1800 U	1900 U	7100 U	7100 U	3700 U	8300 U	7200 U	7700 U	7600 U	7400 U
HEXACHLOROETHANE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	110 J	290 J	830	1500 U	1500 U	650 J	1700 U	350 J	250 J	1600 U	210 J
INDENO(1 2 3-C D)PYRENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
2-METHYLPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
4-METHYLPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
NAPHTHALENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	51 J	59 J	1500 U	1500 U	760 U	1700 U	1500 U	120 J	150 J	180 J
2-NITROANILINE	µg/kg	NA	NA	NA	NA	NA	NA	3400 U	3500 U	6900 U	3400 U	3300 U	3600 U	6900 U	7100 U	1800 U	1800 U	1900 U	7100 U	7100 U	3700 U	8300 U	7200 U	7700 U	7600 U	7400 U
3-NITROANILINE	µg/kg	NA	NA	NA	NA	NA	NA	3400 U	3500 U	6900 U	3400 U	3300 U	3600 U	6900 U	7100 U	1800 U	1800 U	1900 U	7100 U	7100 U	3700 U	8300 U	7200 U	7700 U	7600 U	7400 U
4-NITROANILINE	µg/kg	NA	NA	NA	NA	NA	NA	3400 U	3500 U	6900 U	3400 U	3300 U	3600 U	6900 U	7100 U	1800 U	1800 U	1900 U	7100 U	7100 U	3700 U	8300 U	7200 U	7700 U	7600 U	7400 U
NITROBENZENE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
2-NITROPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
4-NITROPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	3400 U	3500 U	6900 U	3400 U	3300 U	3600 U	6900 U	7100 U	1800 U	1800 U	1900 U	7100 U	7100 U	3700 U	8300 U	7200 U	7700 U	7600 U	7400 U
N-NITROSODI-N-PROPYLAMINE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
N-NITROSODIPHENYLAMINE	µg/kg	NA	NA	NA	NA	NA	NA	1400 U	1400 U	2800 U	1400 U	1400 U	1500 U	2800 U	2900 U	750 U	750 U	760 U	2900 U	2900 U	1500 U	3400 U	3000 U	3200 U	3100 U	3100 U
PENTACHLOROPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	3400 U	3500 U	6900 U	3400 U	3300 U	3600 U	6900 U	7100 U	1800 U	1800 U	1900 U	7100 U	7100 U	3700 U	8300 U	7200 U	7700 U	7600 U	7400 U
PHENANTHRENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	330 J	700 U	160 J	730 U	1400 U	450 J	61 J	120 J	99 J	1500 U	1500 U	760 U	1700 U	1500 U	1100 J	610 J	470 J
PHENOL	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
PYRENE	µg/kg	1400 U	1400 U	NA	700 U	710 U	710 U	710 U	720 U	630 J	700 U	310 J	730 U	1400 U	1500 U	150 J	210 J	250 J	470 J	390 J	160 J	300 J	470 J	890 J	690 J	360 J
1 2 4-TRICHLOROBENZENE	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
2 4 6-TRICHLOROPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	710 U	720 U	1400 U	700 U	680 U	730 U	1400 U	1500 U	370 U	380 U	380 U	1500 U	1500 U	760 U	1700 U	1500 U	1600 U	1600 U	1500 U
2,4,5-TRICHLOROPHENOL	µg/kg	NA	NA	NA	NA	NA	NA	3400 U	3500 U	6900 U	3400 U	3300 U	3600 U	6900 U	7100 U	1800 U	1800 U	1900 U	7100 U	7100 U	3700 U	8300 U	7200 U	7700 U	7600 U	7400 U

Notes:
EPA - U S Environmental Protection Agency
J - estimated value
µg/kg - micrograms per kilogram
NA - not analyzed
PCBs - polychlorinated biphenyls
SVOC - semivolatile organic compound
U - not detected at or above the reporting limit (value indicates the reporting limit)
VOC - volatile organic compound

FIGURES

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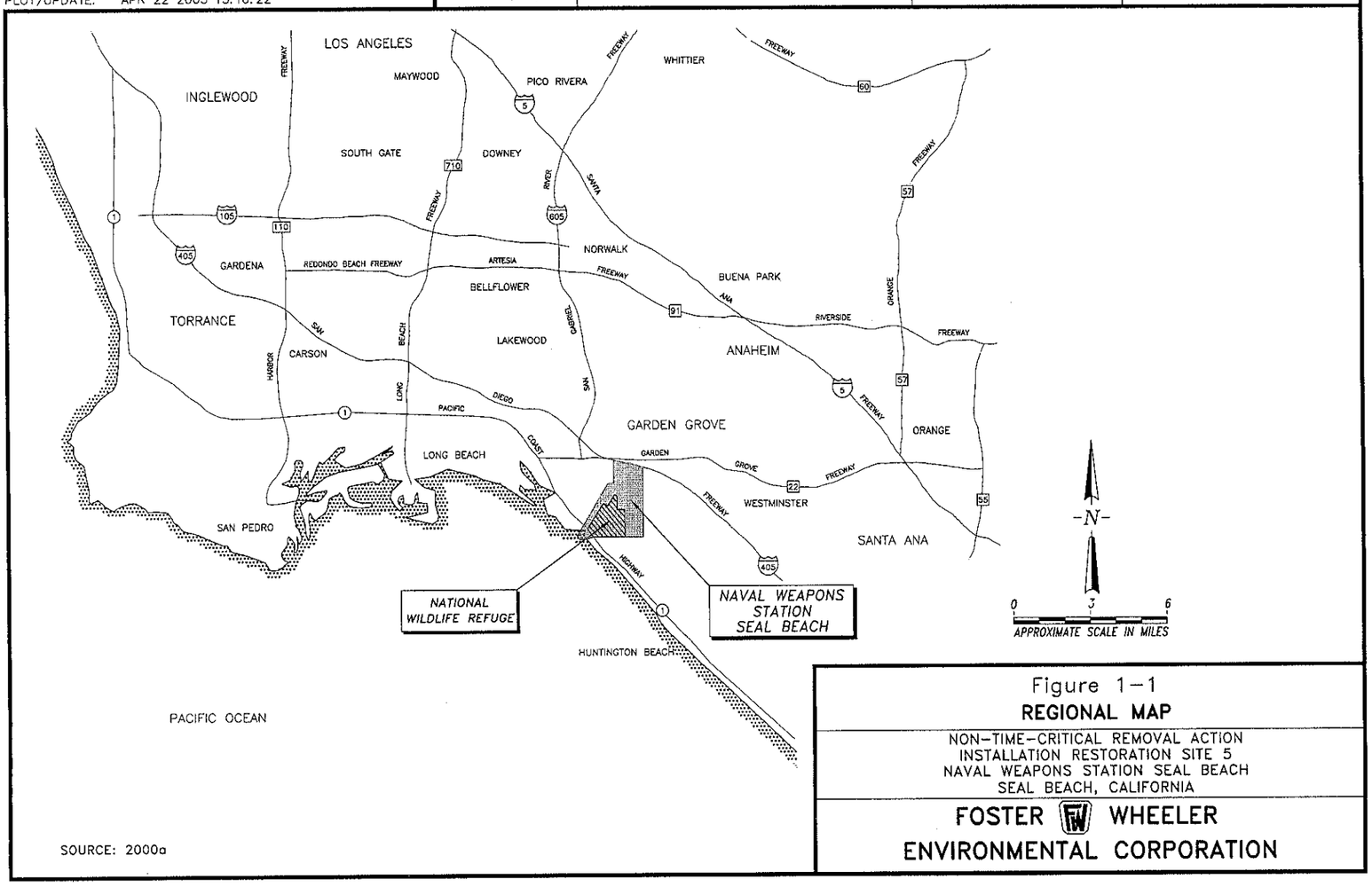
DATE: 04/22/03	REV: REVISION 0		CTO #0023	03018911.DWG



SOURCE: 2000a

Figure 1-1

REGIONAL MAP

NON-TIME-CRITICAL REMOVAL ACTION
INSTALLATION RESTORATION SITE 5
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FOSTER WHEELER ENVIRONMENTAL CORPORATION

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DATE: 04/23/03	REV: REVISION 0		CTO #0023	03018912.DWG

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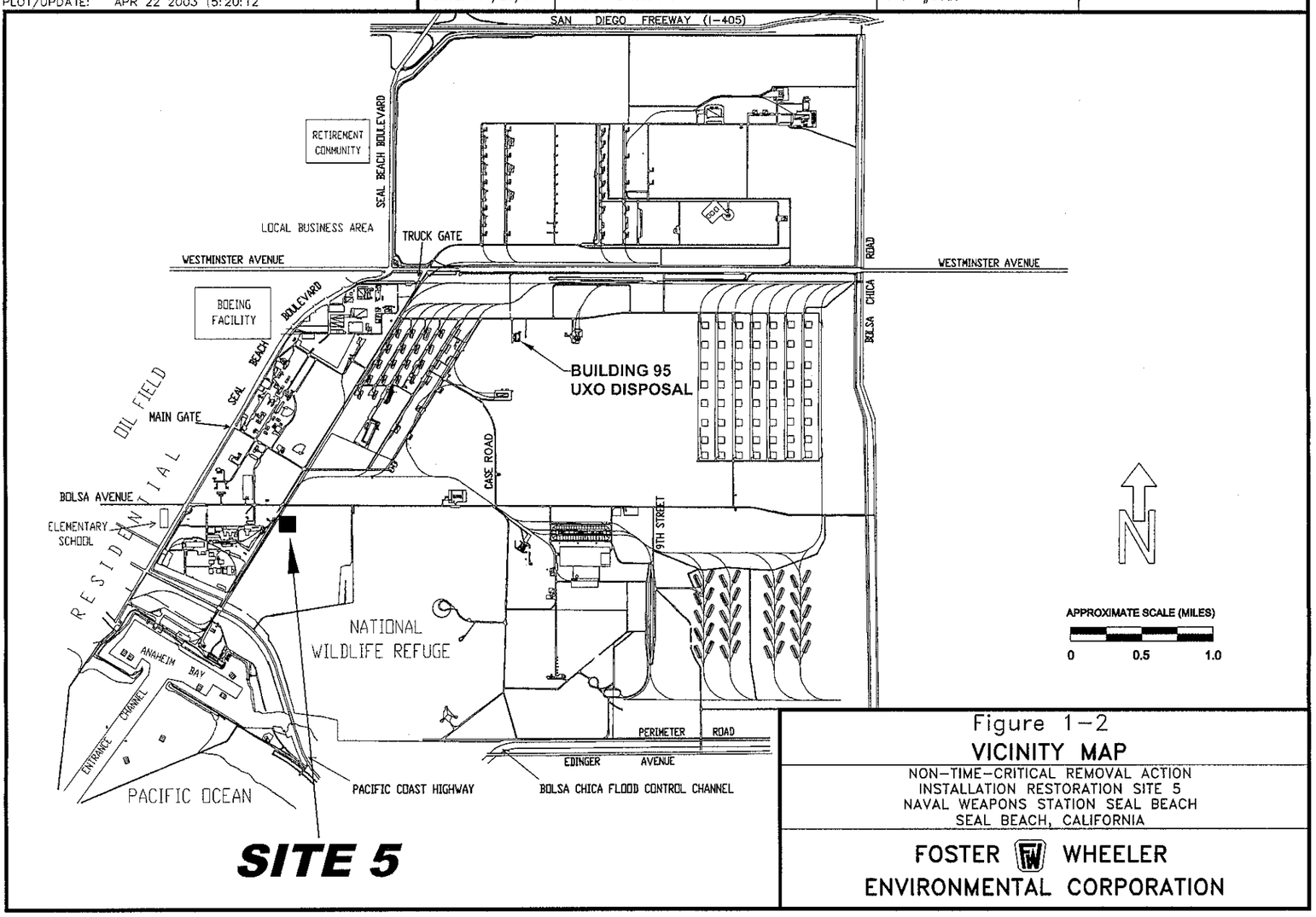

Figure 1-2

VICINITY MAP

NON-TIME-CRITICAL REMOVAL ACTION
INSTALLATION RESTORATION SITE 5
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FOSTER WHEELER ENVIRONMENTAL CORPORATION

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DATE: 04/22/03	REV: REVISION 0		CTO #0023	03018913.DWG

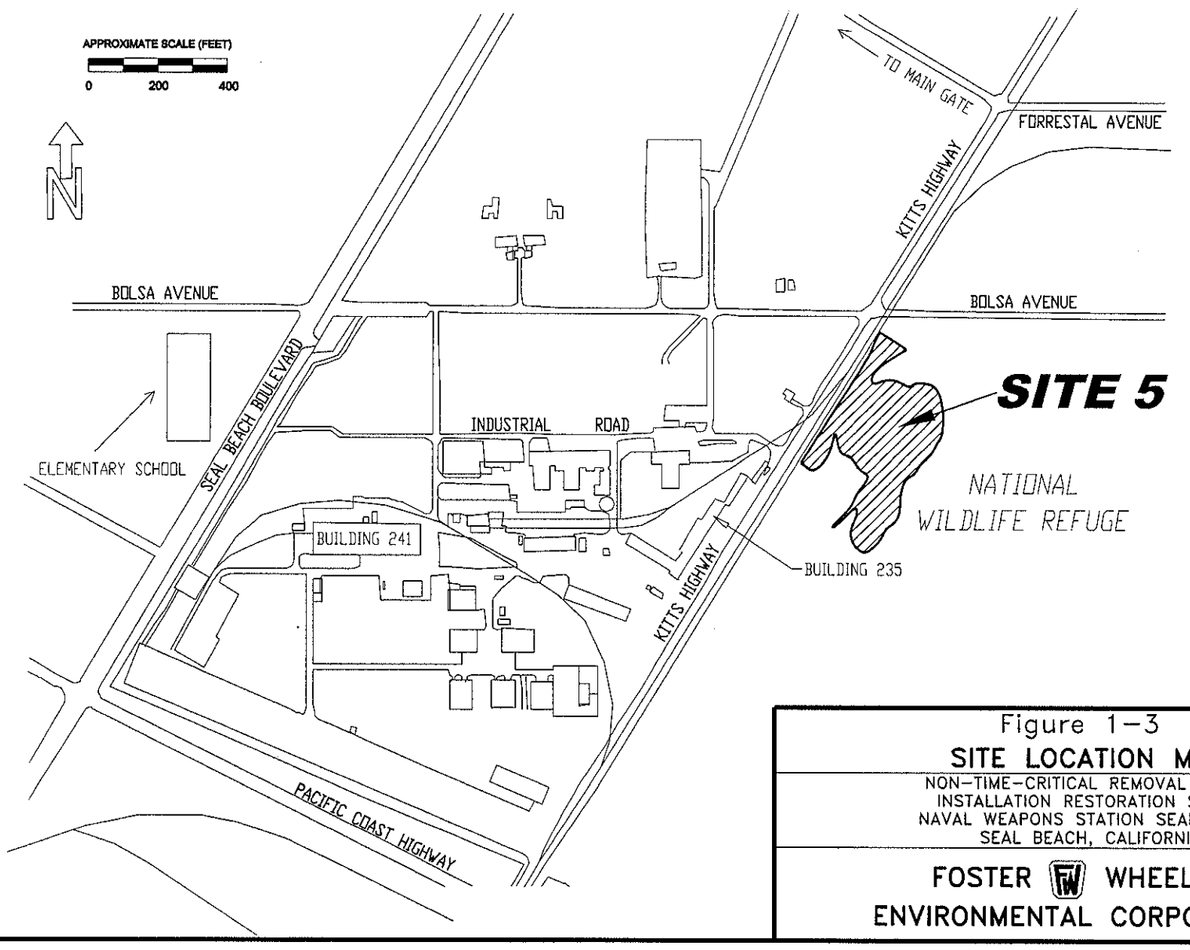

Figure 1-3

SITE LOCATION MAP

NON-TIME-CRITICAL REMOVAL ACTION
INSTALLATION RESTORATION SITE 5
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FOSTER WHEELER
ENVIRONMENTAL CORPORATION

DRAWING NO: 03018921.DWG

DCN: FWSD-RAC-03-0189

CTO #0023

APPROVED BY: HH

CHECKED BY: CJ

REV: REVISION 0

DRAWN BY: MD

DATE: 04/22/03

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PLOT/UPDATE: APR 22 2003 15:18:27

BOLSA AVENUE

BOLSA AVENUE

KITTS HIGHWAY

INDUSTRIAL ROAD

KITTS HIGHWAY

N 2219532.0004
E 6003741.2589

POWER POLE

05-MW-01

05-MW-02

FIRE HYDRANT

APPROXIMATE LOCATION OF EXPOSED 3"-DIAMETER WATER LINE

APPROXIMATE LOCATION OF BURIED WATER LINE (REMOVED)

N 2219317.2140
E 6004078.6995

APPROXIMATE LOCATIONS OF SPIGOTS (REMOVED)

N 2219025.8382
E 6003419.0783

N 2218642.3310
E 6003649.1255

WETLANDS

WETLANDS

GEOPHYSICAL SURVEY GRID LAYOUT

SEAL BEACH NATIONAL WILDLIFE REFUGE

LEGEND

- MONITORING WELL (JEG 1995)
- RAILWAY LINE
- APPROXIMATE LIMITS OF DISPOSAL/FILL AND EXCAVATION LIMITS BASED ON PRE-EXCAVATION LAND SURVEY
- SPOT ELEVATIONS (IN FEET ABOVE MEAN SEA LEVEL)

N

0 100 200

FEET

Figure 2-1
PRE-EXCAVATION TOPOGRAPHY AND SITE PLAN

NON-TIME-CRITICAL REMOVAL ACTION
INSTALLATION RESTORATION SITE 5
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BOLSA AVENUE

BOLSA AVENUE

KITTS HIGHWAY

KITTS HIGHWAY

INDUSTRIAL ROAD

POWER POLE

FIRE HYDRANT

05-MW-01

05-MW-02

APPROXIMATE LOCATION OF EXPOSED 3"-DIAMETER WATER LINE

APPROXIMATE LOCATION OF BURIED WATER LINE (REMOVED)

APPROXIMATE LOCATIONS OF SPIGOTS (REMOVED)

GEOPHYSICAL SURVEY GRID LAYOUT

N 2219532.0004
E 6003741.2580

N 2219317.2140
E 6004078.6995

N 2219025.8382
E 6003419.0783

N 2218642.3310
E 6003649.1265

WETLANDS

WETLANDS

SEAL BEACH NATIONAL WILDLIFE REFUGE

A B C D

1 2 3 4 5 6 7 8

LEGEND

- MONITORING WELL (JEG 1995)
- RAILWAY LINE
- APPROXIMATE LIMITS OF DISPOSAL/FILL AND EXCAVATION LIMITS, BASED ON PRE-EXCAVATION LAND SURVEY
- SPOT ELEVATIONS (IN FEET ABOVE MEAN SEA LEVEL)

174.0
168.0
163.0
157.0
152.0
147.0
141.0
136.0
131.0
125.0
120.0
115.0
109.0
104.0
99.0
93.0
88.0
83.0
77.0
72.0
66.0
61.0
56.0
50.0
45.0
40.0
34.0
29.0
24.0
18.0
13.0
8.0
2.0
-3.0
-8.0
-14.0
-19.0
-24.0

EM-61
Signal Intensity
millivolts

0 100 200
FEET

DRAWN BY: MD | DATE: 04/22/03
CHECKED BY: CJ | REV: REVISION 0
APPROVED BY: HH
DCN: FWSD-RAC-03-0189
CTO #0023
DRAWING NO: 03018941.DWG

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Figure 4-1
PRE-EXCAVATION GEOPHYSICAL SURVEY RESULTS
NON-TIME-CRITICAL REMOVAL ACTION
INSTALLATION RESTORATION SITE 5
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FOSTER WHEELER ENVIRONMENTAL CORPORATION

DRAWING NO: 03018942.DWG

DCN: FWSD-RAC-03-0189

CTO #0023

APPROVED BY: HH

CHECKED BY: CJ

REV: REVISION 0

DRAWN BY: MD

DATE: 04/22/03

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PLOT/UPDATE: APR 22 2003 15:14:05

BOLSA AVENUE

BOLSA AVENUE

KITTS HIGHWAY

KITTS HIGHWAY

INDUSTRIAL ROAD

WETLANDS

WETLANDS

WETLANDS

26,000 SF

35,400 SF

3,300 SF

50'X50' RANDOM SAMPLING GRID PATTERN

SEAL BEACH NATIONAL WILDLIFE REFUGE

B2-A B2-D B2-B B2-C C2-B C2-A C2-C C2-D 2C-P1 D2-A D2-B C3-A C3-B C3-C C3-D 3C-P1 3C-SE1 D3-A D3-B C4-A C4-C C4-D C4-B D4-A D4-B D5-A

LEGEND

- RAILWAY LINE
- APPROXIMATE LIMITS OF EXCAVATION, BASED ON POST-EXCAVATION LAND SURVEY
- APPROXIMATE LIMITS OF AREA EXCAVATED BELOW SURROUNDING WETLANDS GRADE
- +C3-D CONFIRMATION SAMPLE LOCATION
- EXCAVATED 15 TO 20' BELOW SURROUNDING WETLANDS GRADE
- EXCAVATED 25 TO 30' BELOW SURROUNDING WETLANDS GRADE
- EXCAVATED 55 TO 60' OR GRATER BELOW SURROUNDING WETLANDS GRADE

N

0 100 200

FEET

Figure 4-2

EXCAVATION BELOW SURROUNDING WETLANDS GRADE

NON-TIME-CRITICAL REMOVAL ACTION
INSTALLATION RESTORATION SITE 5
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FOSTER WHEELER ENVIRONMENTAL CORPORATION

DRAWN BY: MD	CHECKED BY: CJ	DCN: FWSD-RAC-03-0189	DRAWING NO: 03018943.DWG
DATE: 04/22/03	REV: REVISION 0	CTO #0023	
		APPROVED BY: HH	

I:\1990-RAC\CTO-0023\DWG\030189\03018943.DWG
PLOT/UPDATE: APR 22 2003 15:15:30

BOLSA AVENUE

BOLSA AVENUE

KITTS HIGHWAY

INDUSTRIAL ROAD

KITTS HIGHWAY

WETLANDS

WETLANDS

WETLANDS

SEAL BEACH NATIONAL WILDLIFE REFUGE

DRAINAGE SWALE

N 2218868.3950
E 6003733.3910

N 2218886.0390
E 6003778.2630

N 2218870.3490
E 6003778.8810

CONCRETE PAD/SLA
(LEFT IN PLACE)

N 2218847.4730
E 6003763.5360

N 2218861.7600
E 6003738.3810

LEGEND

x 3.96 — SPOT ELEVATIONS (IN FEET ABOVE MEAN SEA LEVEL)

RAILWAY LINE

EXCAVATION LIMITS BASED ON POST-EXCAVATION LAND SURVEY

TIDAL DRAINAGE FLOW DIRECTION DURING SUBSIDANCE

ELEVATION CONTOUR (IN FEET ABOVE MEAN SEA LEVEL)

174.0
168.0
163.0
157.0
152.0
147.0
141.0
136.0
131.0
125.0
120.0
115.0
109.0
104.0
99.0
93.0
88.0
83.0
77.0
72.0
66.0
61.0
56.0
50.0
45.0
40.0
34.0
29.0
24.0
18.0
13.0
8.0
2.0
-3.0
-8.0
-14.0
-19.0
-24.0

EM-61
Signal Intensity
millivolts

0 100 200
FEET

Figure 4-3
POST-EXCAVATION GEOPHYSICAL SURVEY RESULTS

NON-TIME-CRITICAL REMOVAL ACTION
INSTALLATION RESTORATION SITE 5
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BOLSA AVENUE

BOLSA AVENUE

KITTS HIGHWAY

INDUSTRIAL ROAD

KITTS HIGHWAY

WETLANDS

DRAINAGE SWALE

WETLANDS

WETLANDS

SEAL BEACH NATIONAL WILDLIFE REFUGE

N 2218888.3950
E 6003753.3910

N 2218886.0390
E 6003778.2630

N 2218879.3490
E 6003778.8810

APPROXIMATE DELINEATION OF CONCRETE PAD/SLAB (LEFT IN PLACE)

N 2218847.4730
E 6003763.5360

N 2218861.7600
E 6003738.3810

HP5-33

LEGEND

x 3.96 — SPOT ELEVATIONS (IN FEET ABOVE MEAN SEA LEVEL)

RAILWAY LINE

EXCAVATION LIMITS

TIDAL DRAINAGE FLOW DIRECTION DURING SUBSIDANCE

ELEVATION CONTOUR (IN FEET ABOVE MEAN SEA LEVEL)

N

0 100 200

FEET

Figure 4-4

POST-EXCAVATION TOPOGRAPHY AND FINAL GRADING PLAN

NON-TIME-CRITICAL REMOVAL ACTION
INSTALLATION RESTORATION SITE 5
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

FOSTER WHEELER ENVIRONMENTAL CORPORATION

DRAWING NO: 03018944.DWG

DCN: FWSD-RAC-03-0189

CTO #0023

APPROVED BY: HH

CHECKED BY: CJ

REV: REVISION 0

DRAWN BY: MD

DATE: 04/22/03

I:\1990-RAC\CTO-0023\DWG\030189\03018944.DWG
PLOT/UPDATE: APR 22 2003 15:21:01

APPENDIX A

FIELD CHANGE REQUESTS

FOSTER WHEELER ENVIRONMENTAL CORPORATION
NAVY RAC PROJECT
CONTRACT NO. N68711-98-D-5713

FIELD CHANGE REQUEST
(FCR)

CONTRACT TASK ORDER NAME	CTO # 0023	CHANGE REQUEST NO
SWDIV Contract No. N68711-8-D-5713, Site 5, Naval Weapons Station Seal Beach, Seal Beach, CA		FCR-001
TO NAVY NTR/RPM/COTR Mr. Si T. Le (SWDIV RPM) Ms. Pei-Fen Tamashiro (NAVWPNSTA Seal Beach Environmental Program Manager) Mr. David Crawley (NAVWPNSTA Seal Beach ROICC) Mr. Michael Delaney (NAVWPNSTA Seal Beach Explosive Safety Office)	LOCATION Naval Weapons Station Seal Beach, Seal Beach, California Installation Restoration Site 5 (Clean Fill Disposal)	DATE September 27, 2001

RE: X Drawing No Figure 4 Title (Site 5 Plan View and Estimated Excavation Limits)

X Spec Sections: Appendix C of the Final Work Plan Title: Standard Operating Procedures (Per NAVSEA Instruction 8023.11)

___ Other ___

1. DESCRIPTION (Items involved, submit sketch, if applicable):

Section 4.9 and 4.9.1 of the Final Work Plan and referenced Standard Operating Procedure 2 (SOP) in Appendix C, Entitled Surface Clearance Operations, OE/UXO Intrusive Sampling, Handling, Transportation, and Storage of OE/UXO, page 8-2, subsection 8.3 (Exclusion Zone Establishment), page 8-3, subsection 8.4 (Anomaly Reacquisition), page 8-3, subsection 8.5 (Excavation Procedure). See Attached.

The description of the procedures for the conduct of the activities, and as described in the above referenced sections and subsections of the Final Work Plan and the SOP 3 is deficient and may result in misinterpretation of the originally intended approach in which the activities were proposed to be carried out.

2. REASON FOR CHANGE

The reason for the change is to correct and better describe the procedure for the conduct of the field activities in the above referenced subsections of the SOP 3, and in order to clarify what was originally intended, thus providing a more clear description of the originally intended approach and prevent further future misinterpretations. In addition, based on the interpretation of the geophysical results and data that have been gathered during 9/24/01 through 9/27/01, there is significant number and large concentrations of subsurface anomalies. Based on this discovery, it is most efficient to conduct the activities as initially intended.

3. RECOMMENDED DISPOSITION (Submit sketch, if applicable):

See attached recommended corrections to the SOP 3.

XX Minor Change ___ Major Change (Impacts Cost, Schedule or Technical)

3a. Will this change result in a contract cost or time change? ___ YES XX NO

3b. Estimate of contract cost or time change (if any) ___

PREPARER (Signature)	DATE	PREPARER'S TITLE	SITE SUPERINTENDENT (Signature)	DATE
[signature]	10-1-01		[signature]	Oct 1, 01

4. DISPOSITION

___ Not approved (give reason)

X Considered minor change - approved per Recommended Disposition - Documents will not formally be revised, field to maintain as-built records

___ Considered major change - Navy approval required via contract modification process

1) FOSTER WHEELER ENVIRONMENTAL REGIONAL ENGINEER (Signature) (IF ENGINEERING RELATED)	DATE	2) FOSTER WHEELER ENVIRONMENTAL PROJECT MANAGER (Signature)	DATE
N/A		[signature]	September 28, 2001

3) CIH (Signature) (IF HEALTH AND SAFETY RELATED) J K Fitzgerald ___ Comments (attached) X No Comments	DATE 10/1/01	4) REGIONAL SCIENTIST (Signature) D. A. KELLER (IF SCIENCE RELATED) Sent via email from Keller ✓ Comments (attached) ___ No Comments	DATE 10/1/01
5) QC PROGRAM MANAGER (Signature) Mary Schmidt ___ Comments (attached) ___ No Comments	DATE 10/1/01		

Project Manager distributes to:

CAM	QCM	FCR Preparer
Regional Engineer	Site Superintendent	CIH
Regional Scientist		

REV. 3-13-96

FOSTER WHEELER ENVIRONMENTAL CORPORATION

NAVY RAC PROJECT

CONTRACT NO. SWDIV N68711-98-D-5713

FIELD CHANGE REQUEST

(FCR)

Date September 28, 2001

Attachment 1, FCR 001

Appendix C (Standard Operating Procedures[Per NAVSEA Instructions 8023.11]) SOP #2 (Surface Clearance Operations, OE/UXO Intrusive Sampling, Handling, Transportation, and Storage of OE/UXO.

Appendix C, SOP #2, Subsection 8.3, paragraph 1, first sentence, will be changed to read: "An exclusion zone will be established around the work area once an OE item has been identified and determined to be to hazardous to move. The type of munitions found will determine the exclusion zone distance. The base ESO will be notified to coordinate the placement of exclusion zones."

Appendix C, SOP #2, Subsection 8.4, paragraph 1, will be changed to read: "the geophysical data processing teams will identify Anomalies. The UXO Team Leaders will be provided with dig packages and target maps containing the coordinates of the anomalies. This data will be loaded into the DGPS system."

Appendix C, SOP #2, Subsection 8.4, paragraph 2, will be changed to read: "The intrusive team will use DGPS, geophysical and site maps, and Schonestedt to locate the target areas for excavation."

Appendix C, SOP #2, Subsection 8.5, paragraph 1, will be changed to read:

"Prior to intrusive operations, the Team Leader shall advise the FWENC Site Superintendent that intrusive operations have started.

A Schonestedt detector will be used to locate the boundaries of the anomalies. An excavator will be utilized to remove the soil, The excavator operator will be directed by the UXO Technician where and when to dig. The UXO Technician will observe the excavation visually and will periodically stop the excavation and check the hole with the metal detector to ensure that a potential OE will not be struck with the excavator. Suspect ordnance will be manually excavated."

Appendix C, SOP #2, Subsection 8.5, paragraph 3 will be changed to read: "During manual excavation operations of suspect ordnance, only those personnel that are absolutely necessary for the operation will be within the exclusion zone. All other nonessential personnel will remain outside the exclusion zone during the excavation activity."

Appendix C, SOP #2, Subsection 8.5, paragraph 4, will be changed to read: " If OE is located while excavating the following specific intrusive investigation procedures will be followed.

Appendix C, SOP #2, Subsection 8.5, paragraph 6, will be changed to read: "Investigate each OE item by locating the boundaries, then using a shovel and or trowel to unearth the OE item, while making sure not to strike the item. Once the OE item has been removed the excavation of the surrounding soil can commence by carefully removing 4-6 inch lifts of soil until the bottom of the excavation site or the original pre-disposal ground surface is reached.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

NAVY RAC PROJECT

CONTRACT NO. N68711-98-D-5713

FIELD CHANGE REQUEST

(FCR)

CONTRACT TASK ORDER NAME	CTO #	CHANGE REQUEST NO
Site 5 – Clean Fill Disposal, Naval Weapons Station Seal Beach, Seal Beach, California	CTO # 0023	FCR-002
TO NAVY NTR/RPM/COTR Si Le	LOCATION Seal Beach, California	DATE October 12 2001

RE:

___ Drawing No. _____ Title Change of excavation methodology _____

X Spec Section 4.8 of Final Project Work Plan _____

___ Other _____

1. DESCRIPTION (Items involved, submit sketch, if applicable):

AS AN ALTERNATE TO

Change to Section 4.8 of Final Project Work Plan. The section will be revised to reflect the use of a dozer ~~in place of~~ an excavator for digging soil. The dozer will be used to scrape a 2 to 6-inch-thick layer across the site and push the soil into a stockpile

2. REASON FOR CHANGE

Use of a dozer allows for greater visibility of cut and gives the UXO personnel more opportunity to see larger-sized ordnance (40-mil and up)

3. RECOMMENDED DISPOSITION (Submit sketch, if applicable):

Incorporate change.

X Minor Change ____ Major Change (Impacts Cost, Schedule or Technical)

3a Will this change result in a contract cost or time change? ____ YES X NO

3b. Estimate of contract cost or time charge (if any) _____

PREPARER (Signature)	DATE	PREPARER S TITLE	SITE SUPERINTENDENT (Signature)	DATE
	10/12/01	Project Quality Control Manager		10/12/01

4. DISPOSITION MEL Young Morris Jr Reed UXOSO/RO SUXOS

___ Not approved (give reason)

X Considered minor change - approved per Recommended Disposition - Documents will not formally be revised, field to maintain as-built records

___ Considered major change - Navy approval required via contract modification process

1) FOSTER WHEELER ENVIRONMENTAL REGIONAL ENGINEER (Signature) (IF ENGINEERING RELATED)	DATE	2) FOSTER WHEELER ENVIRONMENTAL PROJECT MANAGER (Signature)	DATE
N/A			10/12/01
3) CIH (Signature) (IF HEALTH AND SAFETY RELATED) ___ Comments (attached) ___ No Comments	DATE 10/15/01	4) ~~REGIONAL SCIENTIST~~ (Signature) Mgmt UXO Contractor (IF SCIENCE RELATED) ___ Comments (attached) ___ No Comments	DATE 10/15/01
5) QC PROGRAM MANAGER (Signature)) ___ Comments (attached) ___ No Comments	DATE 10/15/01		

Project Manager distributes to:

CAM QCM FCR Preparer

Regional Engineer Site Superintendent CIH

Regional Scientist

FOSTER WHEELER ENVIRONMENTAL CORPORATION

NAVY RAC PROJECT

CONTRACT NO N68711-98-D-5713

FIELD CHANGE REQUEST (FCR)

CONTRACT TASK ORDER NAME	CTO # 0023	CHANGE REQUEST NO
SWDIV Contract No. N68711-8-D-5713, Site 5 Naval Weapons Station Seal Beach CA		FCR-003
TO NAVY NTR/RPM/COTR	LOCATION	DATE November 8 2001

RE: ___ Drawing No _____ Title _____

___ Spec Section _____ Title _____

___ Other _____

1. ***DESCRIPTION (Items Involved, submit sketch, if applicable)***: Change to Appendix C, 7.0 Equipment and Procedures, 7.1 Equipment first paragraph, add White's Spectrum XLT metal detector Appendix C, pg 8-3, section 8.5 sentence 2, change to read, "A Vallon, Schonestedt, or White's detector will be used to locate the boundaries of the anomaly.

2. ***General change:*** ~~**Add White's detector were a Vallon or Schonestedt detector will be used.**~~ Replace "Vallon or Schonestedt" with "White's, Vallon, or Schonestedt" throughout the Work Plan and Appendices and Attachments therein. N.N.M.

2. ***REASON FOR CHANGE Add equipment to workplan.***

White's Spectrum XLT Metal detector is a all metals detector which will also locate brass or aluminum in dirt clods.

3. ***RECOMMENDED DISPOSITION (Submit sketch, if applicable):***

___X___ Minor Change ___ Major Change (Impacts Cost, Schedule or Technical)

3a Will this change result in a contract cost or time change? ___ YES _X_ NO

3b. Estimate of contract cost or time charge (if any) _____

PREPARER (Signature)	DATE	PREPARERS TITLE	SITE SUPERINTENDENT (Signature)	DATE
	11/13/01	Senior UXO Supervisor		11/13/01

4. ***DISPOSITION***

___ Not approved (give reason)

___ Considered minor change - approved per Recommended Disposition - Documents will not formally be revised, field to maintain as-built records.

___ Considered major change - Navy approval required via contract modification process.

1) FOSTER WHEELER ENVIRONMENTAL REGIONAL ENGINEER (Signature) (IF ENGINEERING RELATED)	DATE	2) FOSTER WHEELER ENVIRONMENTAL PROJECT MANAGER (Signature)	DATE
			11/13/01

3) CIH (Signature) (IF HEALTH AND SAFETY RELATED)	DATE	4) REGIONAL SCIENTIST (Signature) (IF SCIENCE RELATED)	DATE
___ Comments (attached) _X_ No Comments	11/26/01	___ Comments (attached) ___ No Comments	11/26/01

5) QC PROGRAM MANAGER (Signature)

	DATE
___ Comments (attached) ___ No Comments	11/26/01

Project Manager distributes to:

CAM QCM FCR Preparer

FOSTER WHEELER ENVIRONMENTAL CORPORATION

NAVY RAC PROJECT

CONTRACT NO. N68711-98-D-5713

FIELD CHANGE REQUEST

(FCR)

CONTRACT TASK ORDER NAME	CTO # 0023	CHANGE REQUEST NO
Site 5 – Clean Fill Disposal, Naval Weapons Station Seal Beach, Seal Beach, California		FCR-004
TO NAVY NTR/RPM/COTR Si Le	LOCATION Seal Beach, California	DATE January 9 2002

RE:

___ Drawing No. _____ Title Excavation below surrounding wetlands grade to remove trash interval / backfill to surrounding wetlands grade using screened soil

X Spec Section 4.8 of Final Project Work Plan

___ Other _____

1 DESCRIPTION (Items involved, submit sketch, if applicable):

Change to Section 4.8 of Final Project Work Plan. The section will be revised to reflect the excavation of the trash interval that is below the surrounding wetlands grade. The trash interval is, in part, located below the groundwater/tidal table. Excavation will continue to the extent possible due to visual obstruction by the water table until the trash interval is removed and natural grade is encountered. The trash interval will be removed with an excavator using full-bucket lifts. After the trash interval has been removed the area will be backfilled using previously-excavated soil from the site that has been passed through the mechanical soil-screening plant (i.e. free of ordnance and ordnance-related material). The excavated area will be backfilled to an elevation that is approximately equal to the surrounding wetlands grade.

2. REASON FOR CHANGE

The trash interval is located below the surrounding wetlands grade.

3. RECOMMENDED DISPOSITION (Submit sketch, if applicable):

Incorporate change.

___ Minor Change ___ Major Change (Impacts Cost, Schedule or Technical)

3a Will this change result in a contract cost or time change? ___ YES ___ NO

3b. Estimate of contract cost or time charge (if any)

PREPARER (Signature)	DATE	PREPARER'S TITLE	SITE SUPERINTENDENT (Signature)	DATE
	1/10/02	Project Quality Control Manager		1/10/02

4. DISPOSITION

___ Not approved (give reason)

___ Considered minor change - approved per Recommended Disposition - Documents will not formally be revised, field to maintain as-built records.

___ Considered major change - Navy approval required via contract modification process

1) FOSTER WHEELER ENVIRONMENTAL REGIONAL ENGINEER (Signature) (IF ENGINEERING RELATED)	DATE	2) FOSTER WHEELER ENVIRONMENTAL PROJECT MANAGER (Signature)	DATE
			1/17/02
3) CIH (Signature) (IF HEALTH AND SAFETY RELATED) ___ Comments (attached) ___ No Comments	DATE	4) REGIONAL SCIENTIST (Signature) (IF SCIENCE RELATED) ___ Comments (attached) ___ No Comments	DATE 1/22/02
5) QC PROGRAM MANAGER (Signature) ___ Comments (attached) X No Comments	DATE 1/22/02		

Project Manager distributes to:

CAM OCM FCR Preparer

FOSTER WHEELER ENVIRONMENTAL CORPORATION

NAVY RAC PROJECT

CONTRACT NO N68711-98-D-5713

FIELD CHANGE REQUEST

(FCR)

CONTRACT TASK ORDER NAME	CTO # 0023	CHANGE REQUEST NO
SWDIV Contract No. N68711-98-D-5713 Site 5 Naval Weapons Station Seal Beach CA		FCR-005
TO NAVY NTR/RPM/COTR Sl Le	LOCATION Seal Beach California	DATE January 09 2002

RE: ___ Drawing No. _____ Title Control measures put in place to ensure oversize

___ Spec Section: Addition to Executive Summary pages VI ___ aggregate and vegetation is free of OE before leaving Site 5.

___ Other _____

1. DESCRIPTION (Items involved, submit sketch, if applicable):

Change to Executive Summary of Final Work Plan. This section will be revised to reflect the measures put in place to ensure oversize aggregate and vegetation is free of OE before it is taken from Site 5. Before the oversize Material and vegetation leaves Site 5 it will be spread out on the ground and cleared of all OE material by qualified UXO Technicians using the Whites metal detector The material will then be checked for acceptability by UXOQC QC will also be done with the Whites metal detector and conducted in accordance with MIL-STD-1916.

2. REASON FOR CHANGE

No control measures in place to ensure oversize aggregate and vegetation is free of OE

3 RECOMMENDED DISPOSITION (Submit sketch, if applicable):

Incorporate change.

___ Minor Change ___ Major Change (Impacts Cost, Schedule or Technical)

3a Will this change result in a contract cost or time change? ___ YES ___ NO

3b Estimate of contract cost or time change (if any)

PREPARER (Signature)	DATE	PREPARER'S TITLE	SITE SUPERINTENDENT (Signature)	Date
	01/03/02	UXO QCSO		1/9/02

4. DISPOSITION

___ Not approved (give reason)

___ Considered minor change - approved per Recommended Disposition - Documents will not formally be revised, field to maintain as-built records

___ Considered major change - Navy approval required via contract modification process

1) FOSTER WHEELER ENVIRONMENTAL REGIONAL ENGINEER (Signature) (IF ENGINEERING RELATED) UXO Operations Manager	DATE	2) FOSTER WHEELER ENVIRONMENTAL PROJECT MANAGER (Signature)	DATE 1/17/02
3) CIH (Signature) (IF HEALTH AND SAFETY RELATED) ___ Comments (attached) ___ No Comments	DATE	4) REGIONAL SCIENTIST (Signature) (IF SCIENCE RELATED) ___ Comments (attached) ___ No Comments	DATE 1/22/02
5) QC PROGRAM MANAGER (Signature) ___ Comments (attached) ___ No Comments	DATE 1/22/02		

Project Manager distributes to:

CAM

Regional Engineer
Regional Scientist

OCM

Site Superintendent

FCR Preparer

CIH

REV 3 12/98

FOSTER WHEELER ENVIRONMENTAL CORPORATION
NAVY RAC PROJECT
CONTRACT NO N68711-98-D-5713

FIELD CHANGE REQUEST (FCR)

CONTRACT TASK ORDER NAME	CTO #	CHANGE REQUEST NO
Site 5 – Clean Fill Disposal, Naval Weapons Station Seal Beach, Seal Beach, California	0023	FCR-006
TO NAVY NTR/RPM/COTR: Si Le	LOCATION: Seal Beach, California	DATE: 2/19/02

RE: ___ Drawing No ________

x Spec Section 4.9.2 of Final Project Work Plan

___ Other ________

Title Use of Trummel screen to screen soil excavated from trash interval and oversized material

1 DESCRIPTION (Items involved, submit sketch, if applicable):

Change to Section 4 9 2 of Final Project Work Plan A Trummel-type rotary screen will be utilized in lieu of a standard vibrating rack screen The rotary screen will consist of a 6 grizzly and a ¾ mesh drum A change in the method of sifting the soil was needed due to the presence of wet, silty soil(clay) mixed with various debris that is not compatible with a standard vibrating rack screen Visual observation for UXO will occur at the discharge conveyor belt of the oversize material

2. REASON FOR CHANGE

The excavated trash interval contained wet silty soil mixed with various debris that is not compatible with a standard vibrating rack screen Also the change will aid in expediting the ordnance inspection process by reducing the volume of material that requires visual inspection.

3 RECOMMENDED DISPOSITION (Submit sketch, if applicable):

Incorporate change.

___ Minor Change ___ Major Change (Impacts Cost, Schedule or Technical)

3a. Will this change result in a contract cost or time change? ___ YES ___ NO

3b. Estimate of contract cost or time change (if any) ________

PREPARER (Signature)	DATE	PREPARER'S TITLE	SITE SUPERINTENDENT (Signature)	DATE
[signature]	02/19/02	Project Quality Control Manager		2/19/02

4 DISPOSITION

MEL Young 2/19/02
3-4-02 [signature] 2/19/02

___ Not approved (give reason)

X Considered minor change – approved per Recommended Disposition – Documents will not formally be revised, field to maintain as-built records.

___ Considered major change – Navy approval required via contract modification process

1) FOSTER WHEELER ENVIRONMENTAL REGIONAL ENGINEER (Signature) (IF ENGINEERING RELATED)	DATE	2) FOSTER WHEELER ENVIRONMENTAL PROJECT MANAGER (Signature)	DATE
		[signature]	2/19/02
3) CIH (Signature) (IF HEALTH AND SAFETY RELATED) Roger M Margotto X Comments (attached) ___ No Comments	2/27/02	4) REGIONAL SCIENTIST (Signature) (IF SCIENCE RELATED) ___ Comments (attached) ___ No Comments	DATE
5) QC PROGRAM MANAGER (Signature) ___ Comments (attached) ___ No Comments	DATE		

Project Manager distributes to:

CAM — QCM — FCR Preparer

Regional Engineer — Site Superintendent — CIH — Regional Scientist REV 2 15 06

FCR form

APPENDIX B

ANALYTICAL DATA FOR SOIL SAMPLES

FO WHE ENVIF ENTA PORA NUMBER 02703

1230 Columbia Street, Suite 640 San Diego, CA 92101 (619) 234-8696

CHAIN-OF-CUSTODY RECORD

PROJECT NAME: NAVWPNSTA – Site 5	PURCHASE ORDER NO.: 020721 Task 18
PROJECT LOCATION: Seal Beach, CA	PROJECT NO.: 1990.023D
SAMPLER NAME: Carl Jones	SAMPLER SIGNATURE:
PROJECT CONTACT: Lisa Bienkowski	AIRBILL NUMBER: COURIER

ANALYSES REQUIRED: Title 22 Metals*

LABORATORY NAME: APCL

LABORATORY ID (FOR LABORATORY): 02-1350

Project Information Section Do not submit to Laboratory

SAMPLE ID	DATE COLLECTED	TIME COLLECTED	NO. OF CONTAINER	LEVEL 3	LEVEL 4	TYPE	TAT	Title 22 Metals*	COMMENTS	LOCATION	DEPTH START	DEPTH END	QC
0023-074	1/24/02	1530	1	X		S	5 day	X		3C-F-1	–	–	REG
0023-075	1/24/02	1530	1	X		S	5 day	X		3C-SE-1	–	–	REG
0023-076	1/25/02	0830	1	X		S	5 day	X		3C-F-2	–	–	REG

RELINQUISHED BY (Signature)	DATE 1/24/02	RECEIVED BY (Signature)	
COMPANY FWENC	TIME 1640	COMPANY FWENC	
RELINQUISHED BY (Signature)	DATE 1/25/02	RECEIVED BY (Signature)	
COMPANY FWENC	TIME	COMPANY APCL	
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	
COMPANY	TIME	COMPANY	

LABORATORY INSTRUCTIONS/COMMENTS: * Only analyze for Ba, Pb, Cr, Cu, Zn N/A

COMPOSITE DESCRIPTION: N/A

SAMPLE CONDITION UPON RECEIPT (FOR LABORATORY)
TEMPERATURE _____ SAMPLE CONDITION: ☐ INTACT ☐ BROKEN
COOLER SEAL: ☐ INTACT ☐ BROKEN

SAMPLING COMMENT: Sampling of Black Floor Material

White - Laboratory; Pink - Laboratory; Canary - Project File; Manila - Data Management

02-1350

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990 023D	Collection Date:	01/24/2002
Project ID:	NAVWPSTA Site 5	Service ID:	21350	Collected by:	
		Lab Sample ID:	02-1350-1	Received Date:	01/25/2002
Sample ID:	0023-074	Sample Matrix	Soil	Moisture %:	56 1
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	2 3	180		P		02M1107M	01/28/02	01/28/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	1 1	42 9		P		02M1107M	01/28/02	01/28/02	1	6010B
COPPER	7440-50-8	mg/kg	1 1	51 8		P		02M1107M	01/28/02	01/28/02	1	6010B
LEAD	7439-92-1	mg/kg	0 68	27 8		P		02M1107M	01/28/02	01/28/02	1	6010B
ZINC	7440-66-6	mg/kg	1 1	262		P		02M1107M	01/28/02	01/28/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990 023D	Collection Date:	01/24/2002
Project ID:	NAVWPSTA Site 5	Service ID:	21350	Collected by:	
		Lab Sample ID:	02-1350-2	Received Date:	01/25/2002
Sample ID:	0023-075	Sample Matrix	Soil	Moisture %:	29.7
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.4	125		P		02M1107M	01/28/02	01/28/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.71	22.3		P		02M1107M	01/28/02	01/28/02	1	6010B
COPPER	7440-50-8	mg/kg	0.71	25.7		P		02M1107M	01/28/02	01/28/02	1	6010B
LEAD	7439-92-1	mg/kg	0.43	7.6		P		02M1107M	01/28/02	01/28/02	1	6010B
ZINC	7440-66-6	mg/kg	0.71	153		P		02M1107M	01/28/02	01/28/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL
B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control
* - Duplicate analysis out of control
W - Post digestion spike for GFAA out of control
E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	01/25/2002
Project ID:	NAVWPSTA Site 5	Service ID:	21350	Collected by:	
		Lab Sample ID:	02-1350-3	Received Date:	01/25/2002
Sample ID:	0023-076	Sample Matrix	Soil	Moisture %:	24.2
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.3	130		P		02M1107M	01/28/02	01/28/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.66	23.7		P		02M1107M	01/28/02	01/28/02	1	6010B
COPPER	7440-50-8	mg/kg	0.66	16.6		P		02M1107M	01/28/02	01/28/02	1	6010B
LEAD	7439-92-1	mg/kg	0.40	5.2		P		02M1107M	01/28/02	01/28/02	1	6010B
ZINC	7440-66-6	mg/kg	0.66	50.7		P		02M1107M	01/28/02	01/28/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

FO WHE ENVIF ENTA POR
1230 Columbia Street, Suite 640 San Diego, CA 92101 (619) 234-8696

NUMBER 05.04

CHAIN-OF-CUSTODY RECORD

PROJECT NAME: NAVWPSTA-Site 5	PURCHASE ORDER NO.: 020721 Task 18
PROJECT LOCATION: Seal Beach, CA	PROJECT NO.: 1990.023D
SAMPLER NAME: Carl Jones / Lisa Brenkowski	SAMPLER SIGNATURE:
PROJECT CONTACT: Lisa Brenkowski	AIRBILL NUMBER: COURIER

ANALYSES REQUIRED: EDB (8011)

LABORATORY NAME: APCL

LABORATORY ID (FOR LABORATORY): 02-1418

Project Information Section Do not submit to Laboratory

SAMPLE ID	DATE COLLECTED	TIME COLLECTED	NO. OF CONTAINER	LEVEL 3	LEVEL 4	TYPE	TAT	EDB (8011)	COMMENTS	LOCATION	DEPTH START	DEPTH END	QC
0023-077	11/30/02	1545	1	X		S	5 day	X		3a-2C-F-1	-	-	FD

RELINQUISHED BY (Signature): Lisa Brenkowski	DATE: 11/30/02	RECEIVED BY (Signature):	
COMPANY: TWENC	TIME: 1310	COMPANY: APCL	
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	
COMPANY	TIME	COMPANY	
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	
COMPANY	TIME	COMPANY	

LABORATORY INSTRUCTIONS/COMMENTS: * Only analyze for barium, lead, chromium, copper and zinc

COMPOSITE DESCRIPTION: N/A

SAMPLE CONDITION UPON RECEIPT (FOR LABORATORY)
TEMPERATURE: _____ SAMPLE CONDITION: ☐ INTACT ☐ BROKEN
COOLER SEAL: ☐ INTACT ☐ BROKEN

SAMPLING COMMENT: Sampling of Black Floor Material

White - Laboratory; Pink - Laboratory; Canary - Project File; Manila - Data Management

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	01/30/2002
Project ID:	Naval Weapon Station Site 5	Service ID:	21418	Collected by:	
		Lab Sample ID:	02-1418-1	Received Date:	01/31/2002
Sample ID:	0023-077	Sample Matrix	Soil	Moisture %:	24.7
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM, BA,	7440-39-3	mg/kg	1.3	88.0		P		02M1120M	01/31/02	02/05/02	1	6010B
CHROMIUM, CR,	7440-47-3	mg/kg	0.66	23.7		P		02M1120M	01/31/02	02/05/02	1	6010B
COPPER, CU,	7440-50-8	mg/kg	0.66	18.5		P		02M1120M	01/31/02	02/05/02	1	6010B
LEAD, PB,	7439-92-1	mg/kg	0.40	6.7		P		02M1120M	01/31/02	02/05/02	1	6010B
ZINC, ZN,	7440-66-6	mg/kg	0.66	58.3		P		02M1120M	01/31/02	02/05/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL
B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control
* - Duplicate analysis out of control
W - Post digestion spike for GFAA out of control
E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

FOSTER WHEELER ENVIRONMENTAL CORPORATION
1230 Columbia Street, Suite 640 San Diego, CA 92101 (619) 234-8696

NUMBER 03110

CHAIN-OF-CUSTODY RECORD

PROJECT NAME: NAVWPNSTA SEAL BEACH SITE 5	PURCHASE ORDER NO.: 020721 Task 18
PROJECT LOCATION: SEAL BEACH CA	PROJECT NO.: 1990.023D
SAMPLER NAME: CARL JONES	SAMPLER SIGNATURE:
PROJECT CONTACT: LISA BIENKOWSKI	AIRBILL NUMBER: Courier

LABORATORY NAME: APCL

LABORATORY ID (FOR LABORATORY): 02-1884

Project Information Section Do not submit to Laboratory

SAMPLE ID	DATE COLLECTED	TIME COLLECTED	NO. OF CONTAINER	LEVEL 3	LEVEL 4	TYPE	TAT	EPA 6010B (Title 22 metals)	EPA 8082 (PCBs)	EPA 8015C (SVOCs)	EPA 8015/8020 (VOCs)	STLC Extraction	TCLP Extraction	EPA 6010B*	STLC+TCLP Pb 3/13 (15)	COMMENTS	LOCATION	DEPTH START	DEPTH END	QC
0023-088	3/6/02	0730	5	X		S	5 day	X				X	X	X	X	STOCKPILE D-5, SECTION 1	Stockpile D5	-	-	REG
0023-089	3/6/02	0845	8	X		S	1	X	X	X	X	X	X	X	X	STOCKPILE D-5, SECTION 2	Stockpile D5	-	-	REG
0023-090	3/6/02	0930	5	X		S	1	X				X	X	X	X	STOCKPILE D-5, SECTION 3	Stockpile D5	-	-	REG
0023-091	3/6/02	1000	1	X		S	1							X		B2-B 2.5'	B2-B	2.5'	-	REG
0023-092	3/6/02	1005	1	X		S	1							X		B2-D 3'	B2-D	3'	-	REG
0023-093	3/6/02	1010	1	X		S	1							X		C2-A 3'	C2-A	3'	-	REG
0023-094	3/6/02	1020	1	X		S	1							X		C2-B 2'	C2-B	2'	-	REG
0023-095	3/6/02	1025	1	X		S	1							X		C2-C 3'	C2-C	3'	-	REG
0023-096	3/6/02	1040	1	X		S	1							X		D2-A 2'	D2-A	2'	-	REG
0023-097	3/6/02	1045	1	X		S	1							X		C2-D 2'	C2-D	2'	-	REG
0023-098	3/6/02	1050	1	X		S	1							X		D2-B 2'	D2-B	2'	-	REG

RELINQUISHED BY (Signature)	DATE 3.6.02	RECEIVED BY (Signature)	
COMPANY FLUOR	TIME 1610	COMPANY	
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	
COMPANY	TIME	COMPANY	
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	
COMPANY	TIME	COMPANY	

LABORATORY INSTRUCTIONS/COMMENTS: * Analyze only for barium, chromium, copper, lead, zinc.

COMPOSITE DESCRIPTION: Composite all 5 jars for each sample then analyze. Use Encores for 5035/8260B

SAMPLE CONDITION UPON RECEIPT (FOR LABORATORY)
TEMPERATURE: _____ SAMPLE CONDITION: ☐ INTACT ☐ BROKEN
COOLER SEAL: ☐ INTACT ☐ BROKEN

SAMPLING COMMENT: Stockpile D5 & Grid Sampling

White - Laboratory; Pink - Laboratory; Canary - Project File; Manila - Data Management

02-1884

FOSTER WHEELER ENVIRONMENTAL CORPORATION
1230 Columbia Street, Suite 640 San Diego, CA 92101 (619) 234-8696

NUMBER 03111

CHAIN-OF-CUSTODY RECORD

PROJECT NAME: Site 5 NAVWPNSTA SEAL BEACH	PURCHASE ORDER NO.: 020721 Task 18
PROJECT LOCATION: SEAL BEACH, CA	PROJECT NO.: 1990.023 D
SAMPLER NAME: CARL JONES	SAMPLER SIGNATURE:
PROJECT CONTACT: LISA BIENKOWSKI	AIRBILL NUMBER: COURIER

ANALYSES REQUIRED: EPA 6010 B*

LABORATORY NAME: APCL

LABORATORY ID (FOR LABORATORY): 02-1884

Project Information Section Do not submit to Laboratory

SAMPLE ID	DATE COLLECTED	TIME COLLECTED	NO. OF CONTAINER	LEVEL 3	LEVEL 4	TYPE	TAT	COMMENTS	LOCATION	DEPTH START	DEPTH END	QC
0023-099	3/6/02	1055	1	X		S	3 DAY	D3-A 2.5'	D3-A	2.5'	–	REG
0023-100	"	1200	1	X		S	"	C3-C 2'	C3-C	2'	–	REG
0023-101		1210	1	X		S	"	C3-A 3'	C3-A	3'	–	REG
0023-102		1215	1	X		S	"	D3-B 3'	D3-B	3'	–	REG
0023-103		1220	1	X		S	"	C3-D 3'	C3-D	3'	–	REG
0023-104		1230	1	X		S	"	D4-A 3'	D4-A	3'	–	REG
0023-105		1240	1	X		S	"	C4-C 3'	C4-C	3'	–	REG
0023-106		1250	1	X		S	"	C4-A 3'	C4-A	3'	–	REG
0023-107		1300	1	X		S	"	D4-B 2'	D4-B	2'	–	REG
0023-108		1310	1	X		S	"	C4-D 2'	C4-D	2'	–	REG
0023-109	↓	1320	1	X		S	↓	D5-A 2'	D5-A	2'	–	REG

RELINQUISHED BY (Signature)	DATE: 3-6-02	RECEIVED BY (Signature): Mel Hutton
COMPANY: FWENC	TIME: 1610	COMPANY
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)
COMPANY	TIME	COMPANY
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)
COMPANY	TIME	COMPANY

LABORATORY INSTRUCTIONS/COMMENTS: * Analyze for barium, chromium, copper, lead, and zinc ONLY

COMPOSITE DESCRIPTION

SAMPLE CONDITION UPON RECEIPT (FOR LABORATORY)
TEMPERATURE: _____ SAMPLE CONDITION: ☐ INTACT ☐ BROKEN
COOLER SEAL: ☐ INTACT ☐ BROKEN

SAMPLING COMMENT: Grid Sampling

White - Laboratory; Pink - Laboratory; Canary - Project File; Manila - Data Management

02-1884

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-4	Received Date:	03/06/2002
Sample ID:	0023-091	Sample Matrix	Soil	Moisture %:	32 7
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.5	127		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0 74	23 5		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.74	29 6		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.45	8.6		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.74	82.0		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990 023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-5	Received Date:	03/06/2002
Sample ID:	0023-092	Sample Matrix	Soil	Moisture %:	15.1
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.2	202		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.59	35.6		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.59	56.4		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.35	270		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.59	403		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-6	Received Date:	03/06/2002
Sample ID:	0023-093	Sample Matrix	Soil	Moisture %:	72.8
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	3.7	414		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	1.8	20.3		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	1.8	18.1		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	1.1	4.2		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	1.8	28.9		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL
B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control
* - Duplicate analysis out of control
W - Post digestion spike for GFAA out of control
E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA
CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-7	Received Date:	03/06/2002
Sample ID:	0023-094	Sample Matrix	Soil	Moisture %:	69 8
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	3 3	163		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	1 7	21 3		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	1 7	20 1		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0 99	11 1		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	1 7	62 0		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

57442

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-8	Received Date:	03/06/2002
Sample ID:	0023-095	Sample Matrix	Soil	Moisture %:	37.7
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.6	137		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.80	41.3		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.80	38.9		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.48	7.5		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.80	112		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

57443

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-9	Received Date:	03/06/2002
Sample ID:	0023-096	Sample Matrix	Soil	Moisture %:	51 7
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	2.1	73.2		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	1.0	35.2		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	1.0	34.1		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0 62	32 9		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	1.0	109		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

57444

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-10	Received Date:	03/06/2002
Sample ID:	0023-097	Sample Matrix	Soil	Moisture %:	68.5
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	3.2	155		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	1.6	18.7		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	1.6	20.2		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.95	9.6		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	1.6	57.9		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-11	Received Date:	03/06/2002
Sample ID:	**0023-098**	Sample Matrix	Soil	Moisture %:	15.9
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.2	73.1		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.59	17.4		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.59	20.2		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.36	50.8		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.59	92.6		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL
B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control
* - Duplicate analysis out of control
W - Post digestion spike for GFAA out of control
E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990 023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-12	Received Date:	03/06/2002
Sample ID:	0023-099	Sample Matrix	Soil	Moisture %:	65.6
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	2.9	157		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	1.5	32.7		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	1.5	20.0		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.87	7.5		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	1.5	540		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990 023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-13	Received Date:	03/06/2002
Sample ID:	0023-100	Sample Matrix	Soil	Moisture %:	65.4
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	2.9	80.4		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	1.4	30.5		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	1.4	32.0		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.87	11.8		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	1.4	95.2		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL
B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control
* - Duplicate analysis out of control
W - Post digestion spike for GFAA out of control
E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

57448

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-14	Received Date:	03/06/2002
Sample ID:	**0023-101**	Sample Matrix	Soil	Moisture %:	23 4
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.3	281		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0 65	26.5		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0 65	15.0		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.39	6 5		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.65	55.9		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-15	Received Date:	03/06/2002
Sample ID:	**0023-102**	Sample Matrix	Soil	Moisture %:	60.4
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	2.5	188		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	1.3	405		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	1.3	39.7		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.76	126		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	1.3	445		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL
B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control
* - Duplicate analysis out of control
W - Post digestion spike for GFAA out of control
E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-16	Received Date:	03/06/2002
Sample ID:	0023-103	Sample Matrix	Soil	Moisture %:	22.3
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.3	102		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.64	18.2		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.64	15.8		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.32	6.0		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.64	43.0		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990 023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-17	Received Date:	03/06/2002
Sample ID:	0023-104	Sample Matrix	Soil	Moisture %:	41 1
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.7	74.5		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.85	33 0		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.85	28.1		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.51	10.3		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.85	85 5		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-18	Received Date:	03/06/2002
Sample ID:	**0023-105**	Sample Matrix	Soil	Moisture %:	20.6
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.3	133		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.63	19.6		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.63	15.9		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.38	6.6		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.63	42.0		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-19	Received Date:	03/06/2002
Sample ID:	**0023-106**	Sample Matrix	Soil	Moisture %:	16.2
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.2	57.5		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.60	21.0		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.60	15.4		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.36	5.7		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.60	51.5		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-20	Received Date:	03/06/2002
Sample ID:	**0023-107**	Sample Matrix	Soil	Moisture %:	14.1
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.2	67.4		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.58	23.5		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.58	25.2		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.35	19.1		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.58	112		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-21	Received Date:	03/06/2002
Sample ID:	0023-108	Sample Matrix	Soil	Moisture %:	15 1
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.2	72 0		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0 59	21.6		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.59	13 3		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.35	5.1		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.59	47.0		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

57456

Applied P & Ch Laboratory

Metal Analysis Results

Client Name:	Foster Wheeler Environmental Corp	Project No:	1990.023D	Collection Date:	03/06/2002
Project ID:	Naval Weapon Station	Service ID:	21884	Collected by:	
		Lab Sample ID:	02-1884-22	Received Date:	03/06/2002
Sample ID:	**0023-109**	Sample Matrix	Soil	Moisture %:	17.8
Sample Type:	Field Sample				

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
BARIUM	7440-39-3	mg/kg	1.2	61.6		P		02M1260M	03/08/02	03/08/02	1	6010B
CHROMIUM	7440-47-3	mg/kg	0.61	16.9		P		02M1260M	03/08/02	03/08/02	1	6010B
COPPER	7440-50-8	mg/kg	0.61	16.9		P		02M1260M	03/08/02	03/08/02	1	6010B
LEAD	7439-92-1	mg/kg	0.37	5.8		P		02M1260M	03/08/02	03/08/02	1	6010B
ZINC	7440-66-6	mg/kg	0.61	48.6		P		02M1260M	03/08/02	03/08/02	1	6010B

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL

Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control

M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

APPENDIX C

ORDNANCE CERTIFICATION
DD FORM 1348-A1

DD FORM 1348-1A, JUL 91 ISSUE RELEASE/RECEIPT DOCUMENT

Barrel #	Seal #	Barrel #	Seal #
1	443413	2	443414
3	443415	4	443416
5	443417	6	443418
7	443419	8	443420
9	443421	10	443422
11	443423/43	12	443424
13	443425	14	443426
15	443427	16	443428
17	443430	18	443431
19	443432	20	443433
21	443434	22	443435/37

1. TOTAL PRICE

2. SHIP FROM

3. SHIP TO

4. MARK FOR

UNIT PRICE DOLLARS | CTS

DOLLARS | CTS

5. DOC DATE | 6. NMFC | 7. FRT RATE | 8. TYPE CARGO | 9. PS

10. QTY. REC'D | 11.UP | 12. UNIT WEIGHT | 13. UNIT CUBE | 14. UFC | 15. SL

16. FREIGHT CLASSIFICATION NOMENCLATURE

17. ITEM NOMENCLATURE: O.E. Scrap Metals

18. TY CONT | 19. NO CONT: 22 | 20. TOTAL WEIGHT: 7,200lbs | 21. TOTAL CUBE

22. RECEIVED BY | 23. DATE RECEIVED

24. DOCUMENT NUMBER & SUFFIX (30-44)

25. NATIONAL STOCK NO. & ADD (8-22)

26. RIC (4-6) UI (23-24) QTY (25-29) CON CODE (71) DIST (55-56) UP (74-80)

27. ADDITIONAL DATA

This certifies and verifies that the AEDA residue, range residue and /or explosive contaminated property listed has been 100%properly inspected and to the best of our knowledge and belief are free of explosives or related material.

MELVIN N. YOUNG	SUXOS	MORRIS REED	QUALITY CONTROL
PRINT NAME	POSITON	PRINT NAME	POSITION

4-26-02

SIGNATURE

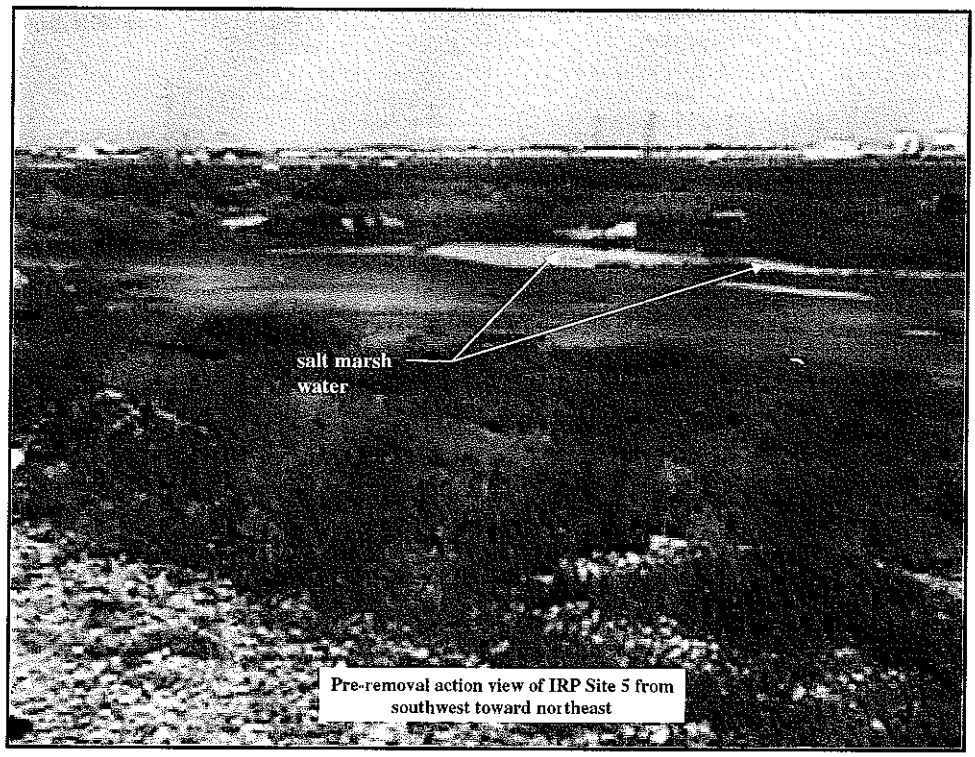
SIGNATURE

PREVIOUS EDITION MAY BE USED

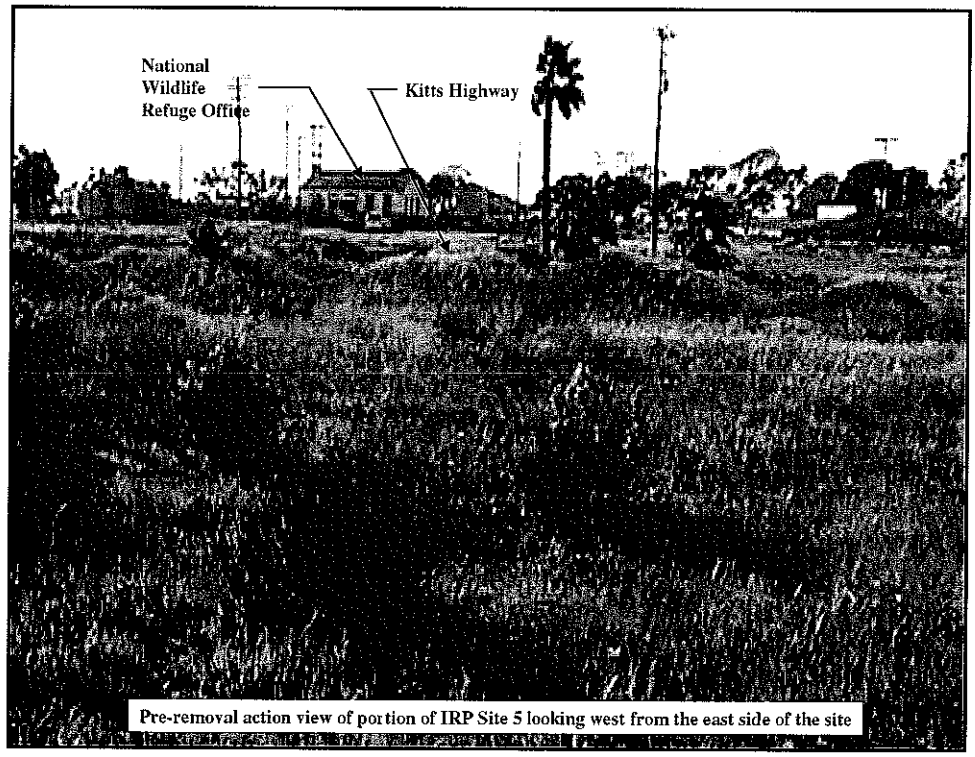
USAPA V1 00

APPENDIX D

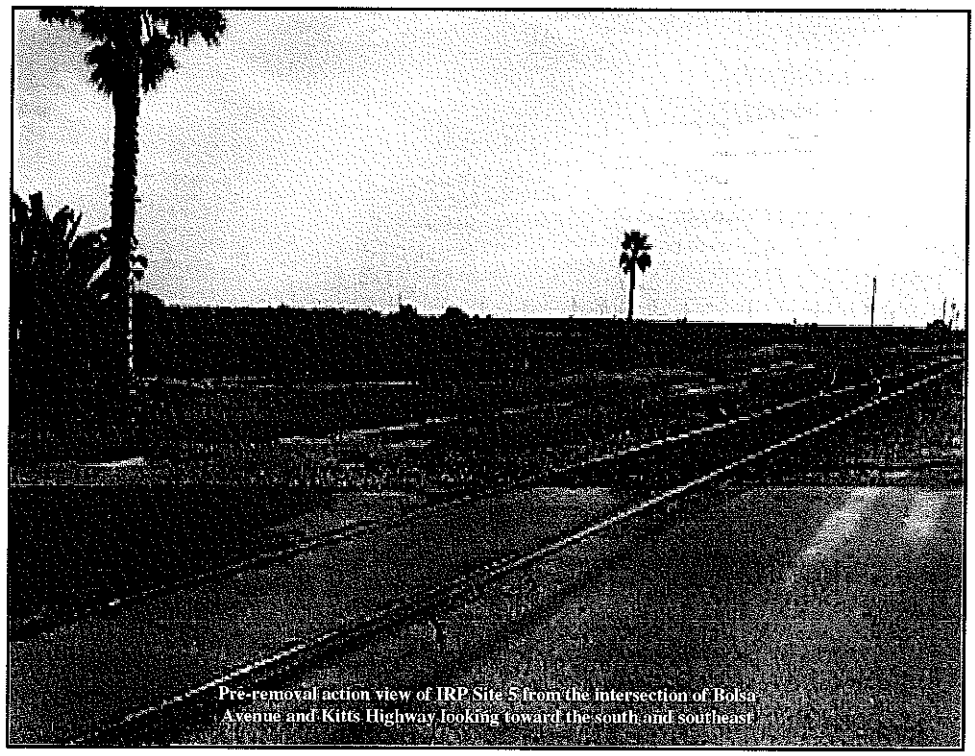
PHOTOGRAPHIC LOG



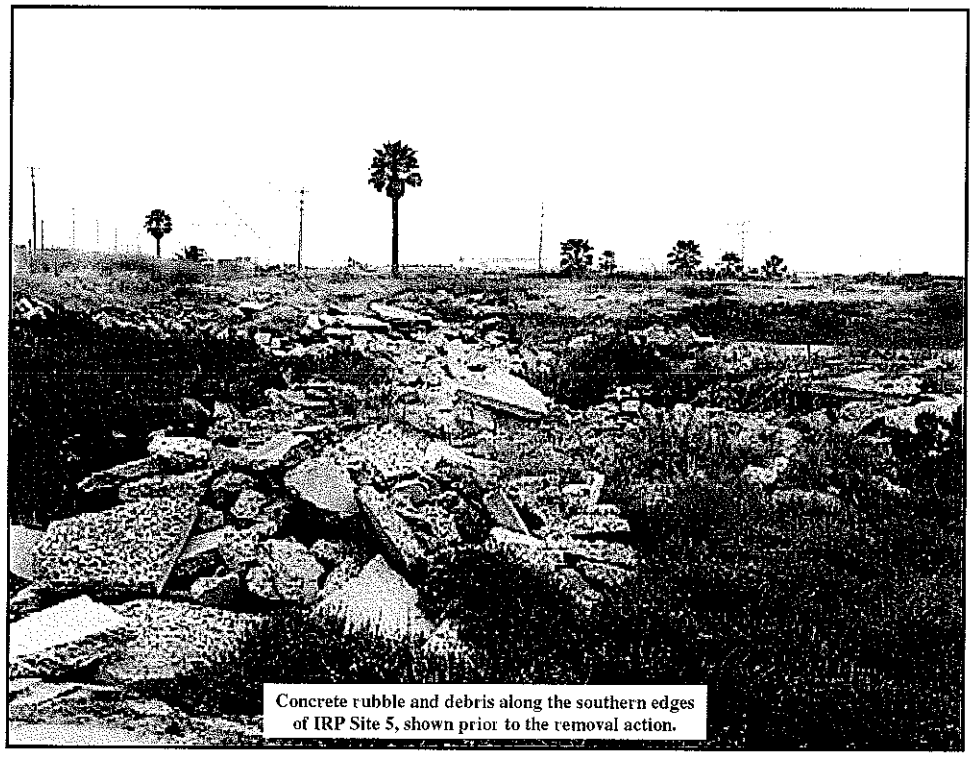
Pre-removal action view of IRP Site 5 from southwest toward northeast



Pre-removal action view of portion of IRP Site 5 looking west from the east side of the site

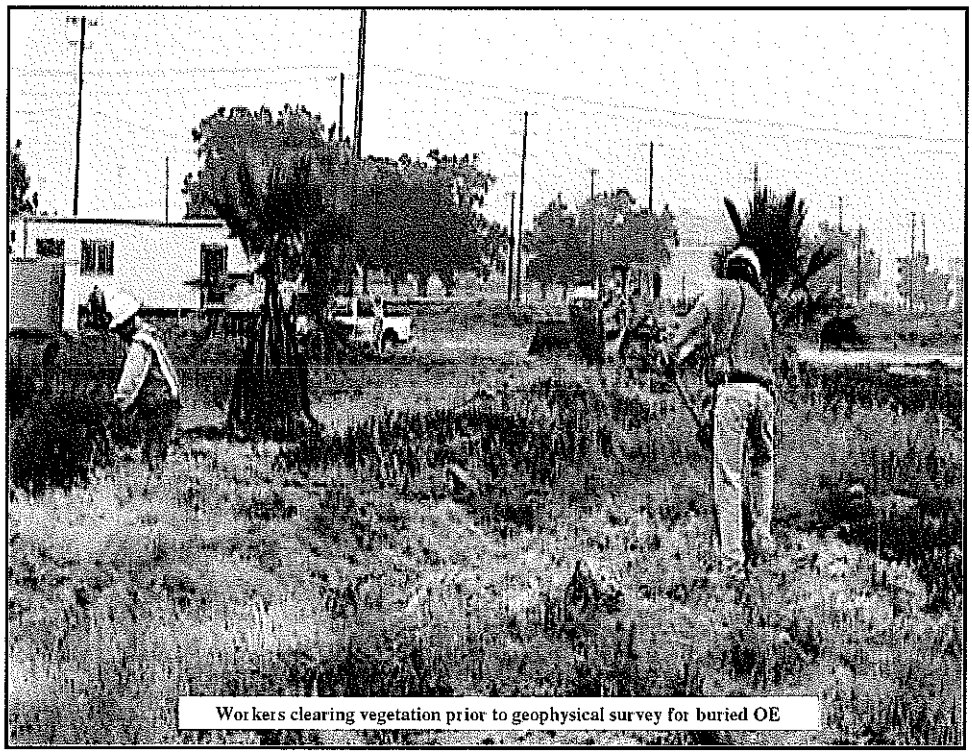


Pre-removal action view of IRP Site 5 from the intersection of Bolsa Avenue and Kitts Highway looking toward the south and southeast.



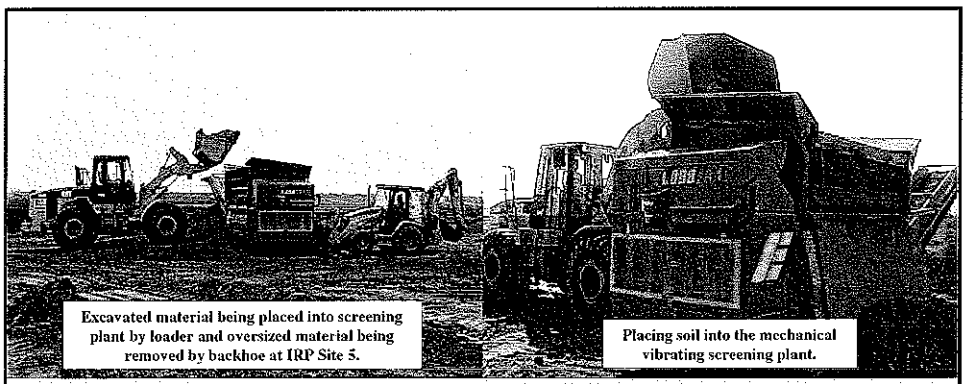
Concrete rubble and debris along the southern edges of IRP Site 5, shown prior to the removal action.

UXO specialists performing surface OE survey to clear area before vegetation clearance (yellow rope used to delineate clearance area)



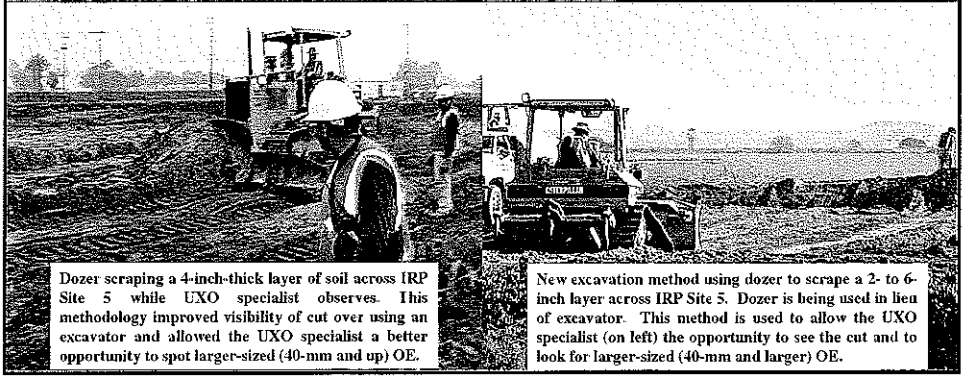
Workers clearing vegetation prior to geophysical survey for buried OE

Excavation of soil and dust control at IRP Site 5



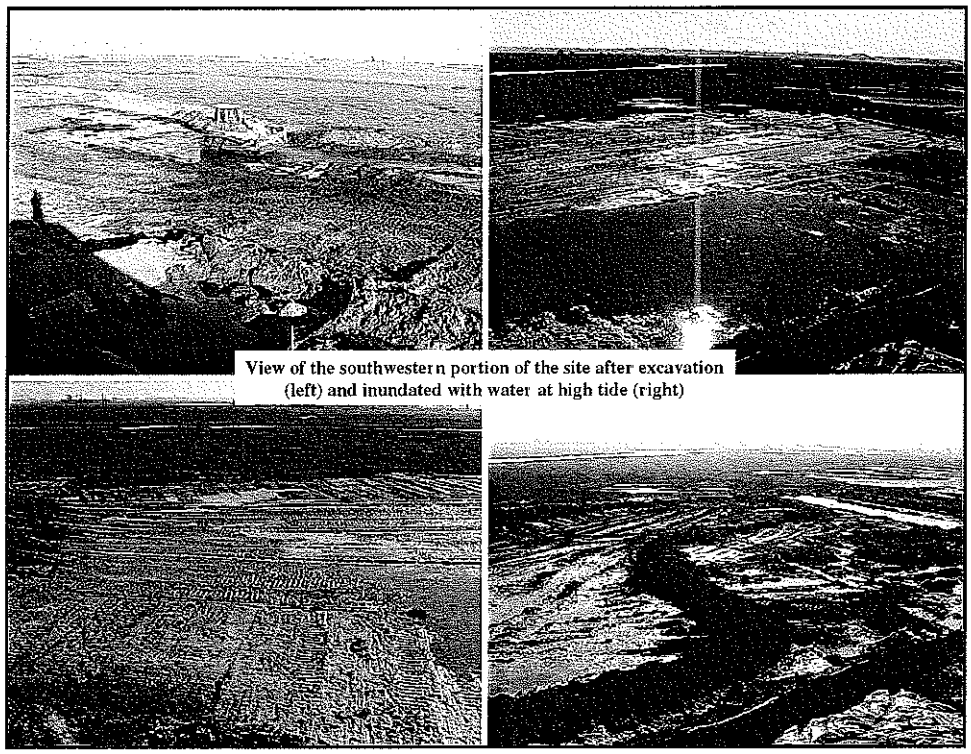
Excavated material being placed into screening plant by loader and oversized material being removed by backhoe at IRP Site 5.

Placing soil into the mechanical vibrating screening plant.

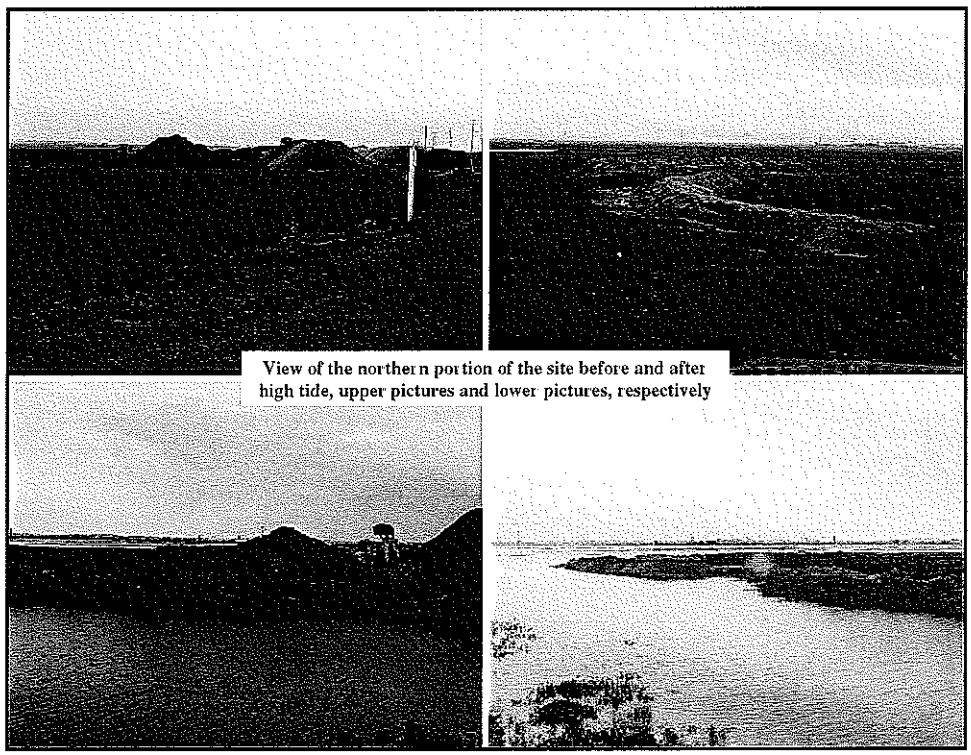


Dozer scraping a 4-inch-thick layer of soil across IRP Site 5 while UXO specialist observes. This methodology improved visibility of cut over using an excavator and allowed the UXO specialist a better opportunity to spot larger-sized (40-mm and up) OE.

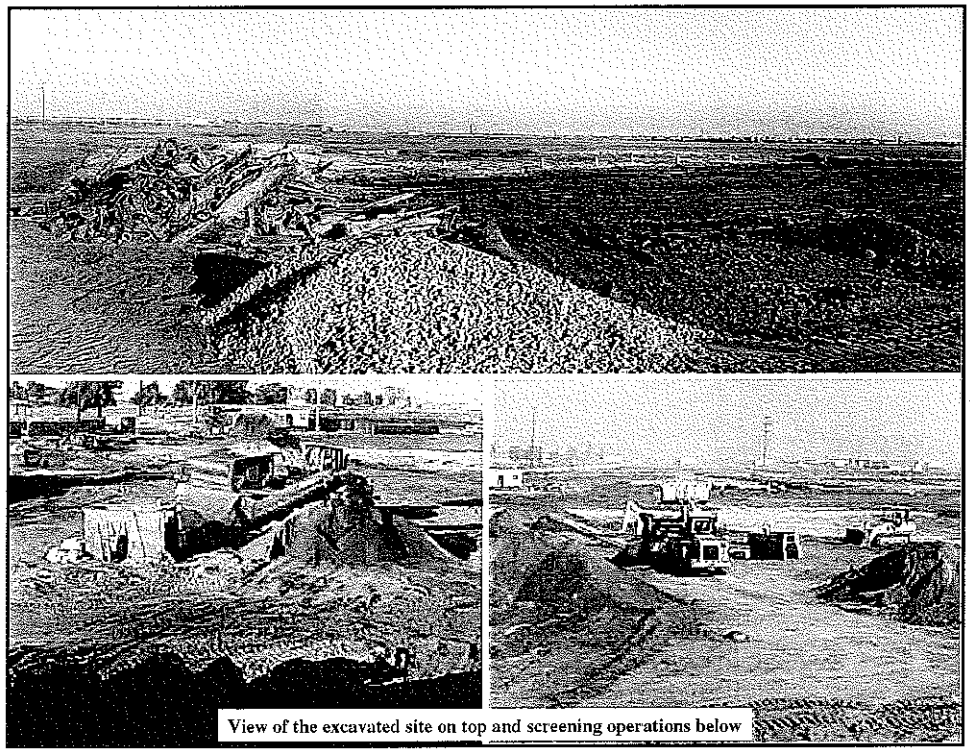
New excavation method using dozer to scrape a 2- to 6-inch layer across IRP Site 5. Dozer is being used in lieu of excavator. This method is used to allow the UXO specialist (on left) the opportunity to see the cut and to look for larger-sized (40-mm and larger) OE.



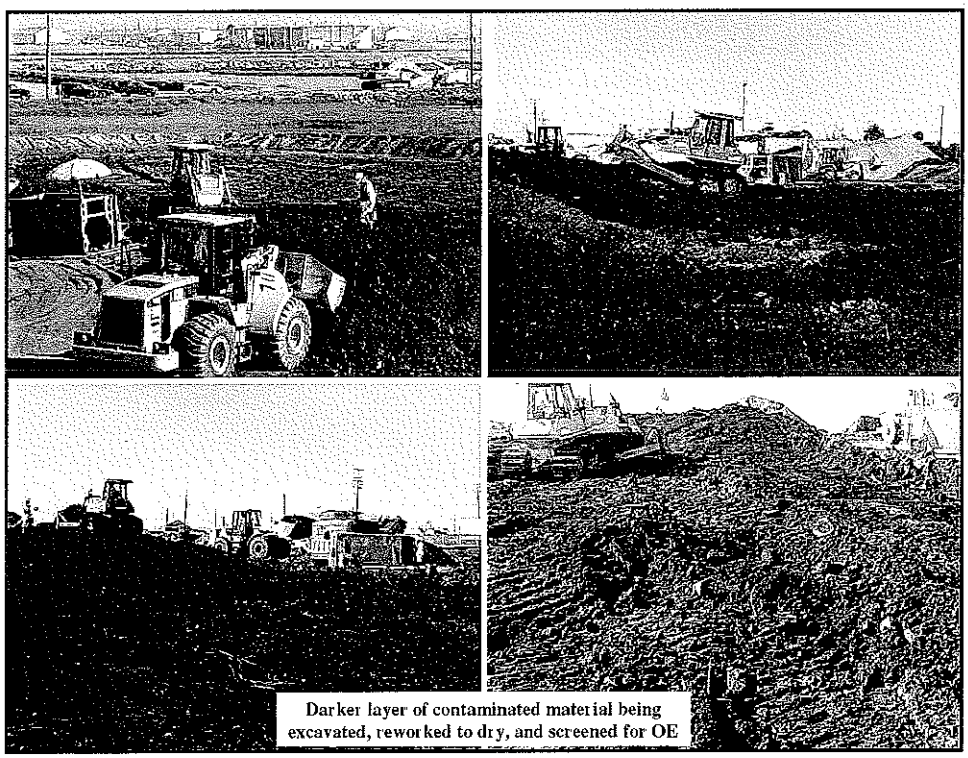
View of the southwestern portion of the site after excavation (left) and inundated with water at high tide (right)



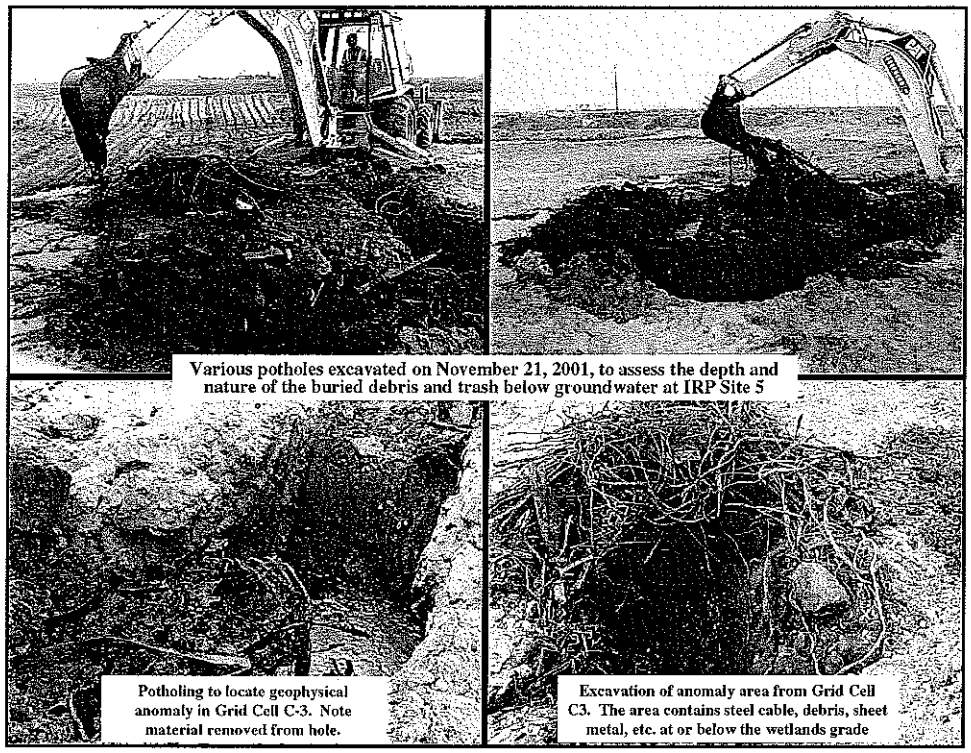
View of the northern portion of the site before and after high tide, upper pictures and lower pictures, respectively



View of the excavated site on top and screening operations below



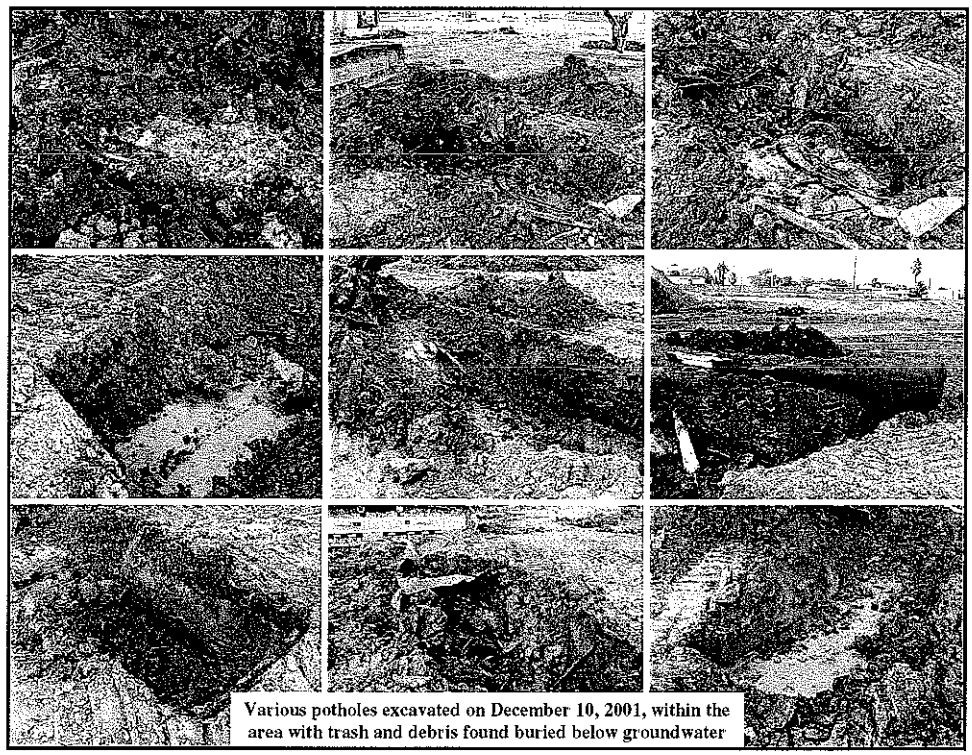
Darker layer of contaminated material being excavated, reworked to dry, and screened for OE



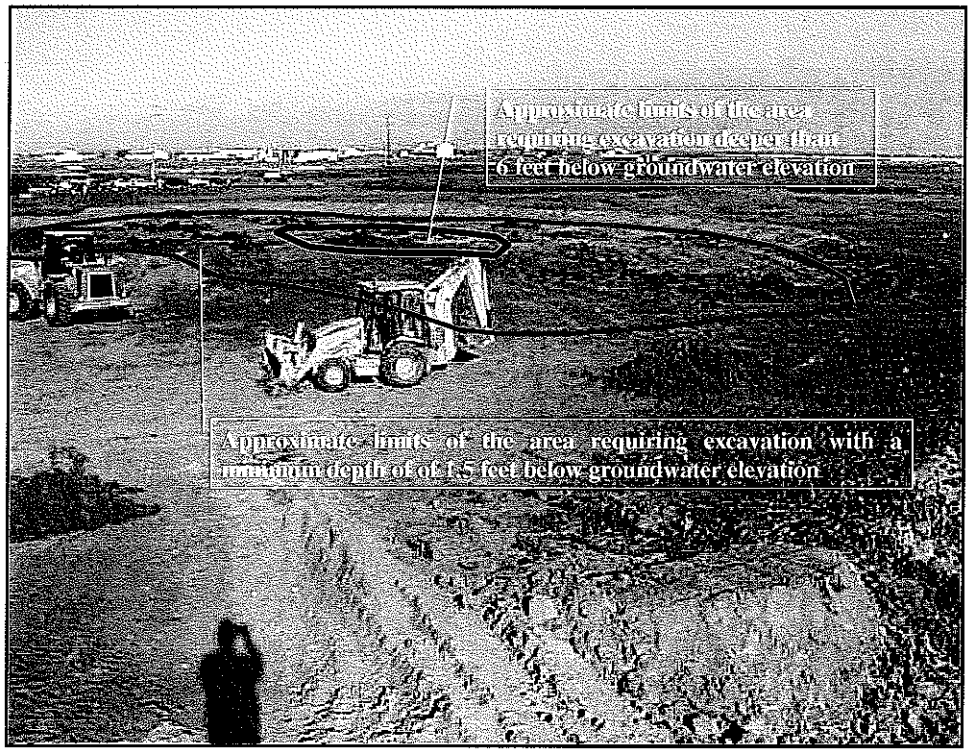
Various potholes excavated on November 21, 2001, to assess the depth and nature of the buried debris and trash below groundwater at IRP Site 5

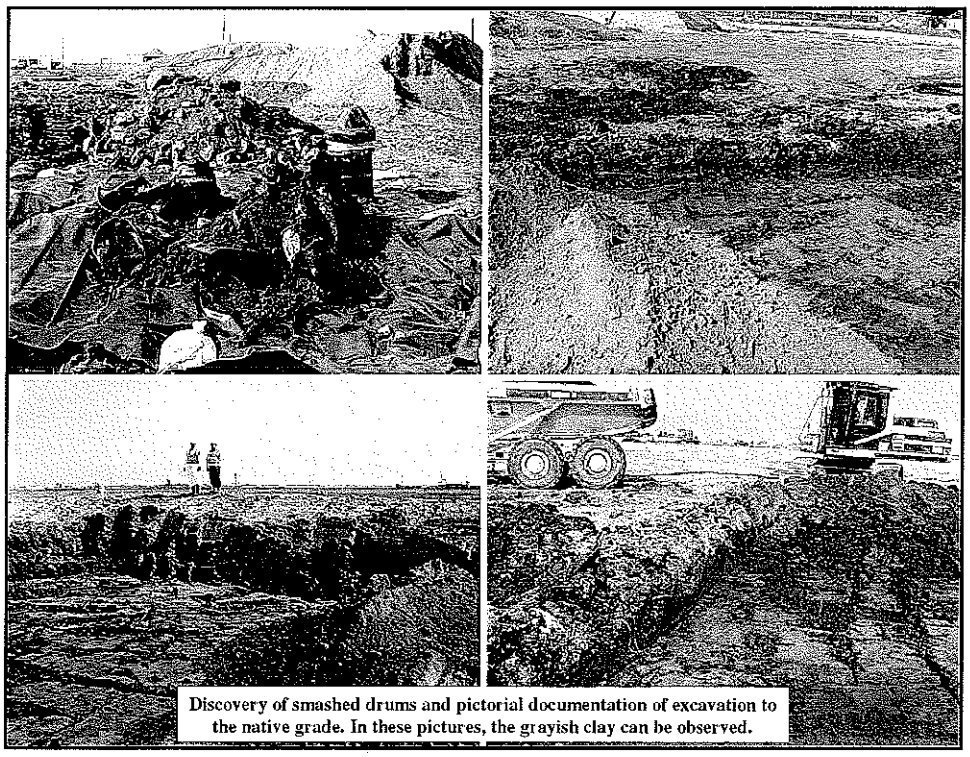
Potholing to locate geophysical anomaly in Grid Cell C-3. Note material removed from hole.

Excavation of anomaly area from Grid Cell C3. The area contains steel cable, debris, sheet metal, etc. at or below the wetlands grade

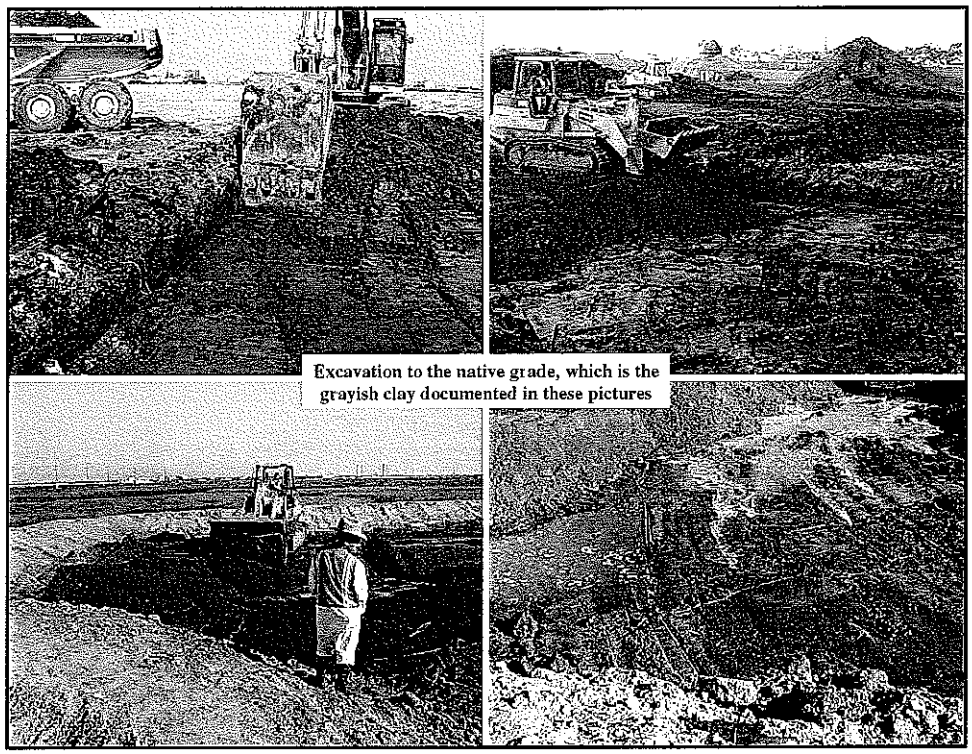


Various potholes excavated on December 10, 2001, within the area with trash and debris found buried below groundwater

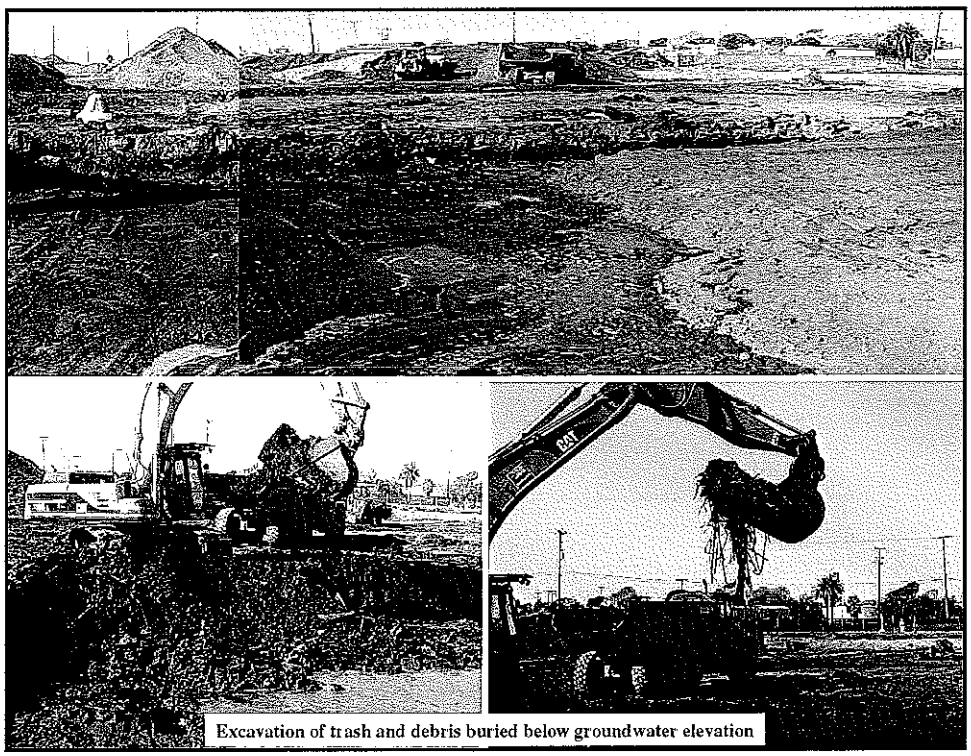




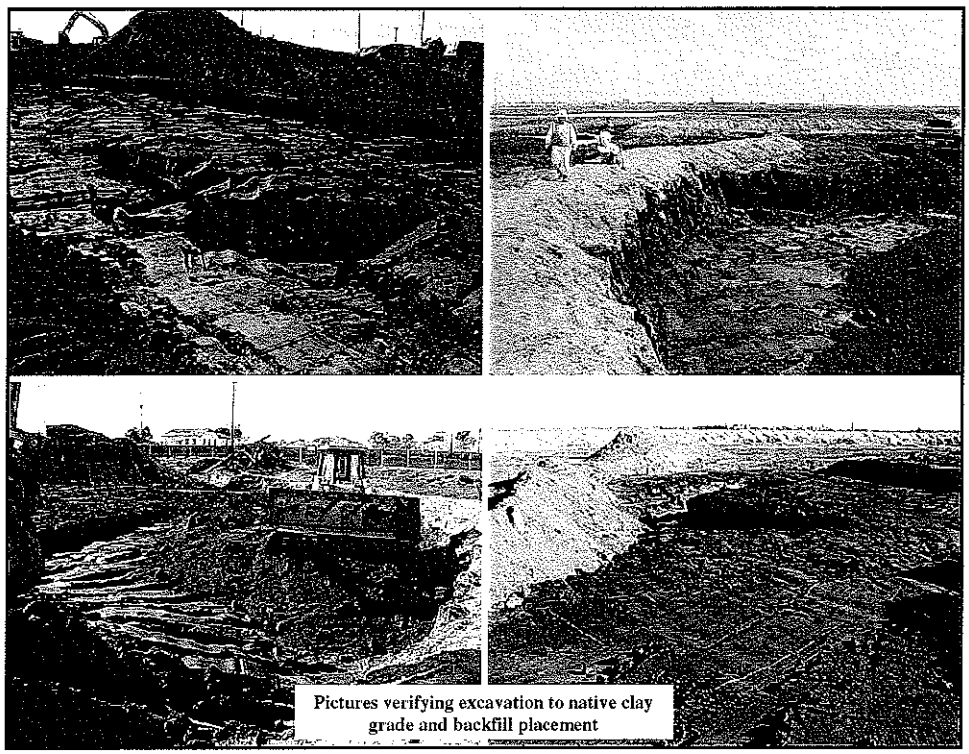
Discovery of smashed drums and pictorial documentation of excavation to the native grade. In these pictures, the grayish clay can be observed.



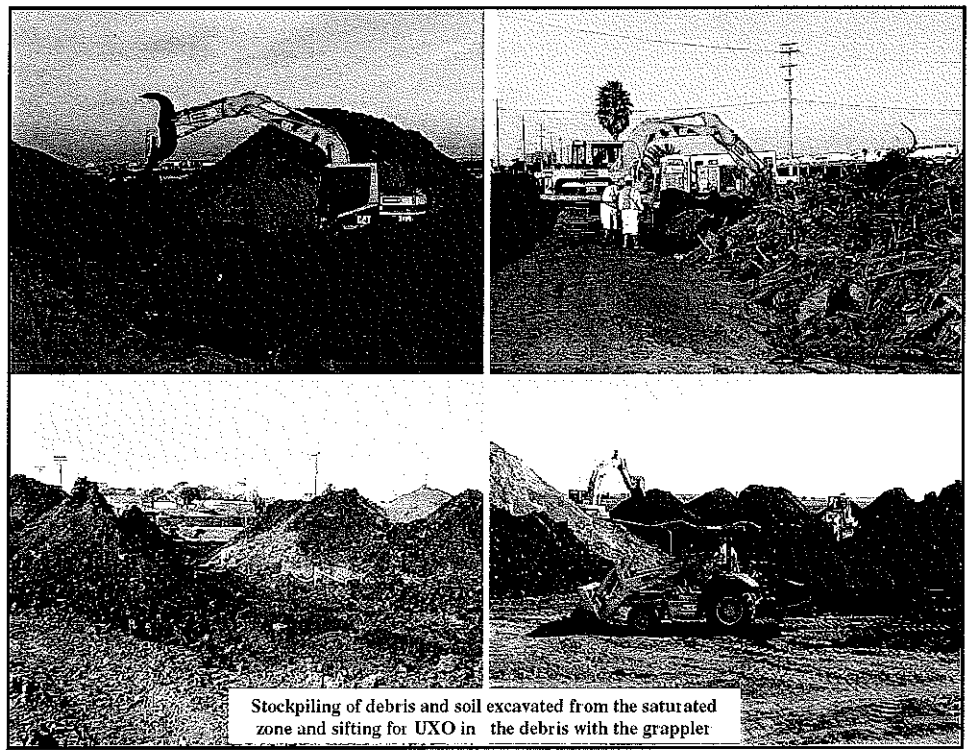
Excavation to the native grade, which is the grayish clay documented in these pictures



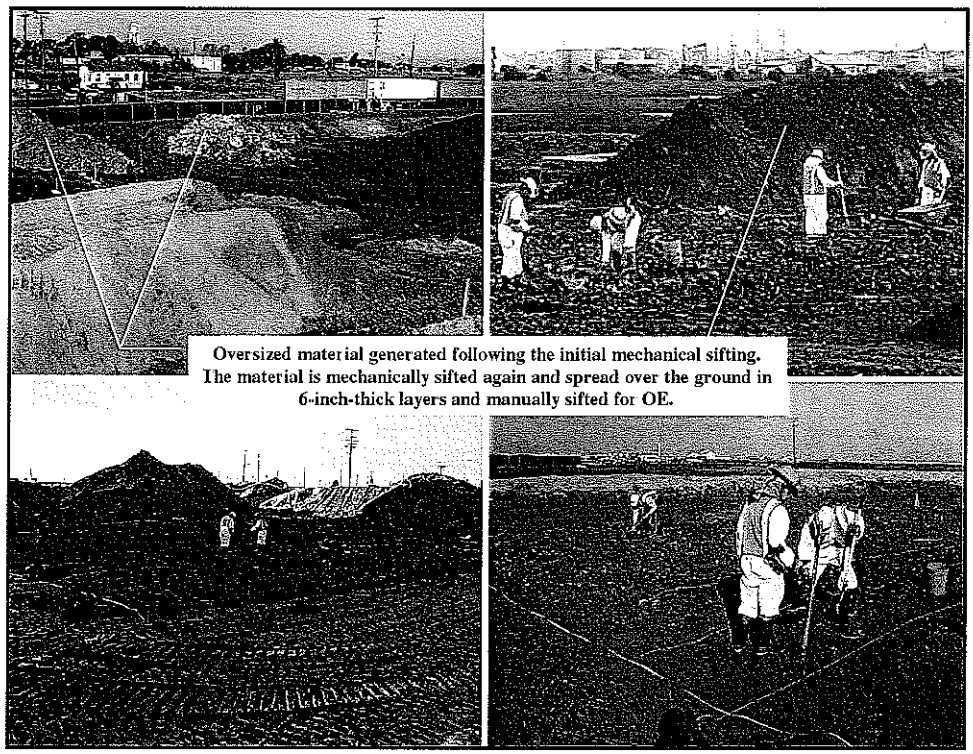
Excavation of trash and debris buried below groundwater elevation



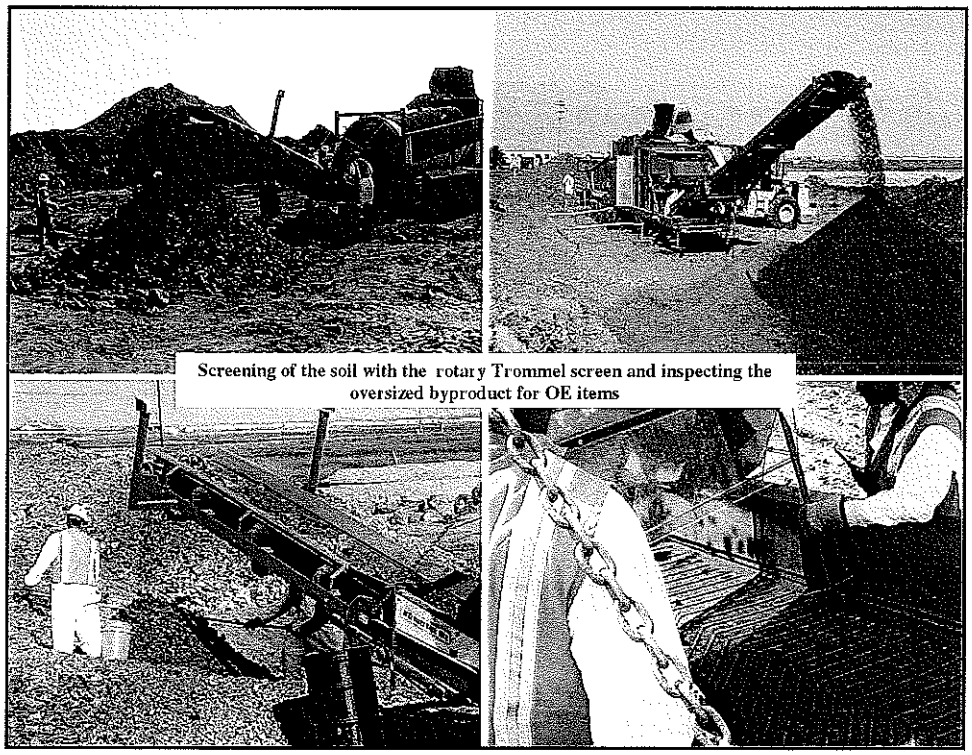
Pictures verifying excavation to native clay grade and backfill placement



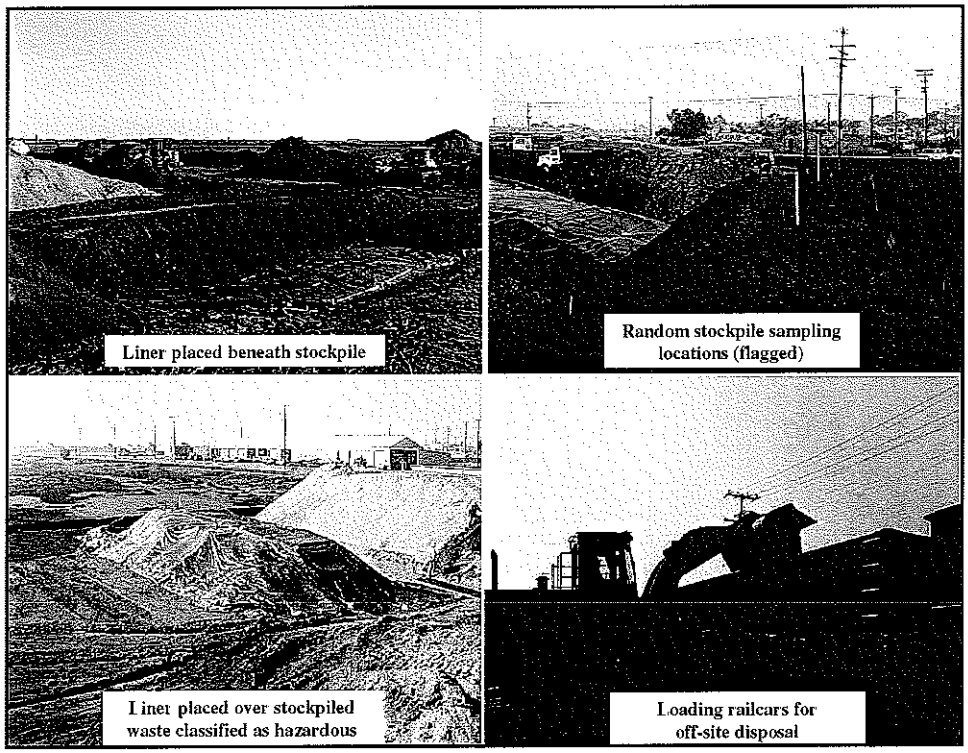
Stockpiling of debris and soil excavated from the saturated zone and sifting for UXO in the debris with the grappler

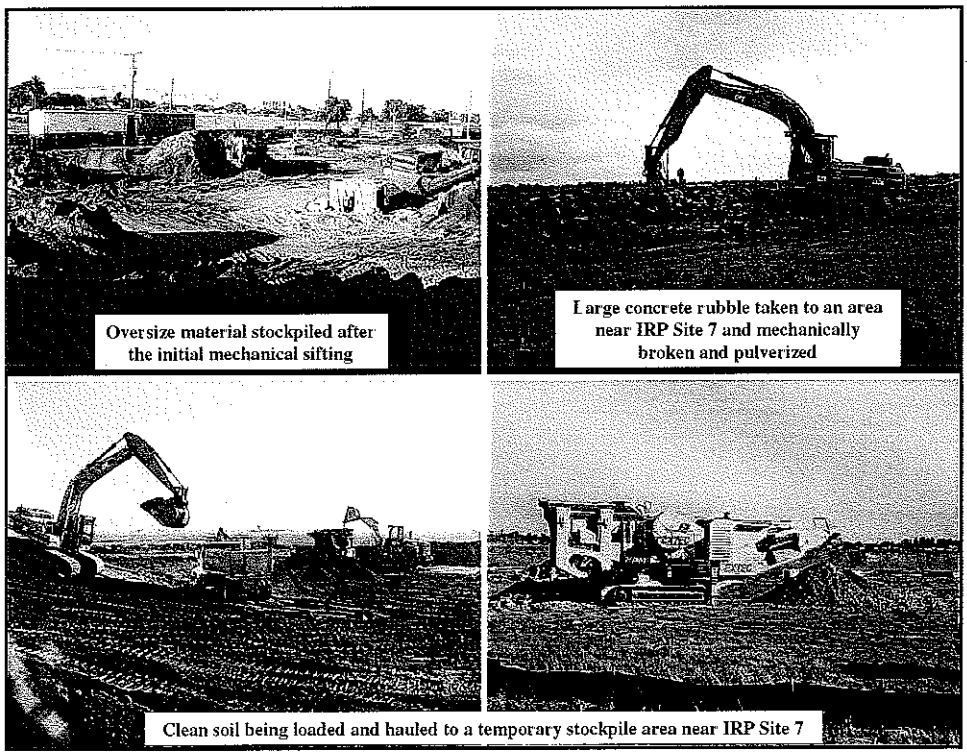


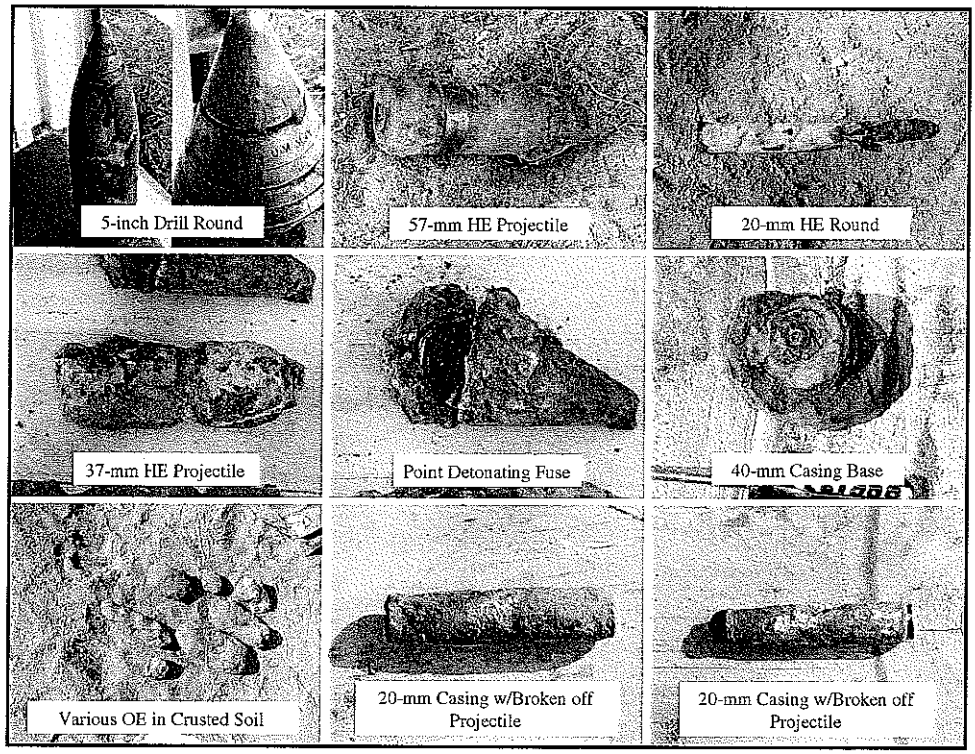
Oversized material generated following the initial mechanical sifting. The material is mechanically sifted again and spread over the ground in 6-inch-thick layers and manually sifted for OE.

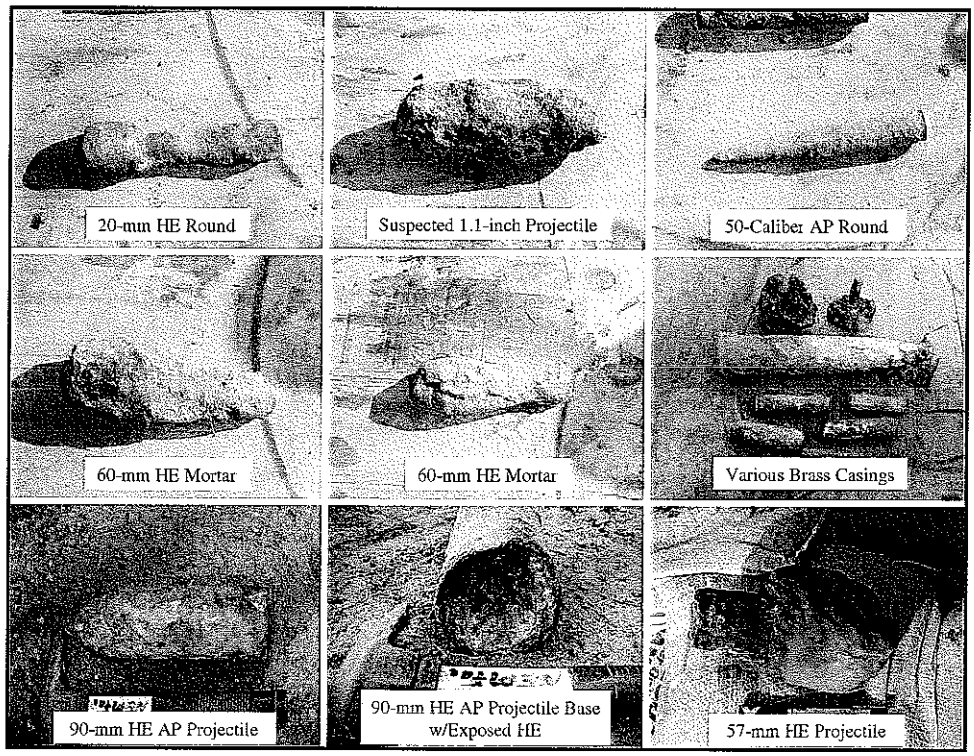


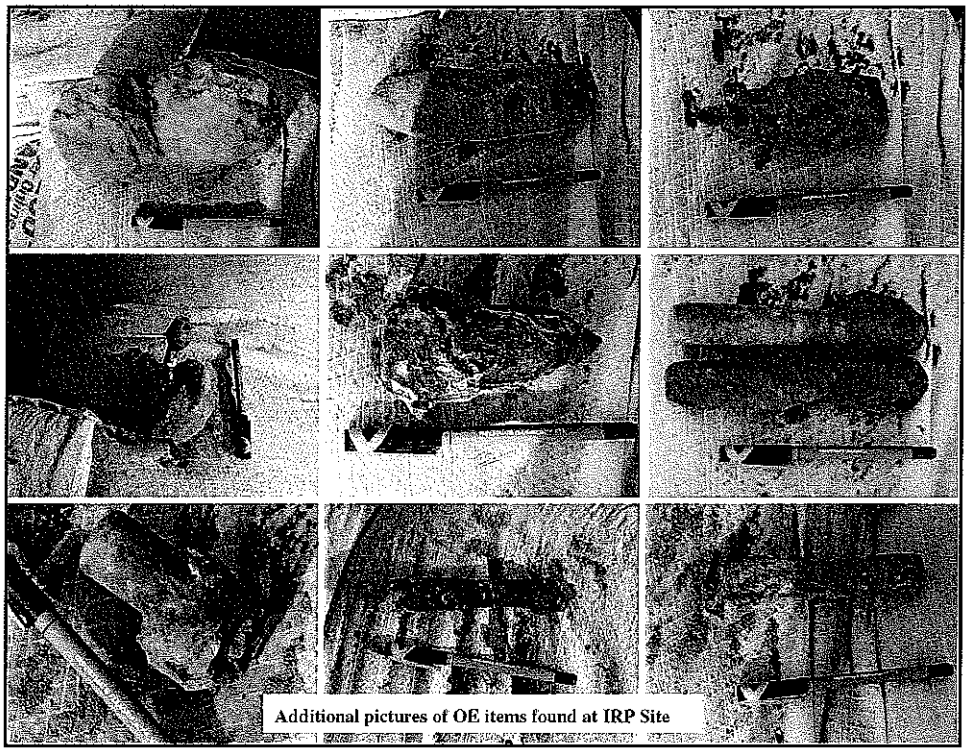
Screening of the soil with the rotary Trommel screen and inspecting the oversized byproduct for OE items


Liner placed beneath stockpile
Random stockpile sampling locations (flagged)
Liner placed over stockpiled waste classified as hazardous
Loading railcars for off-site disposal

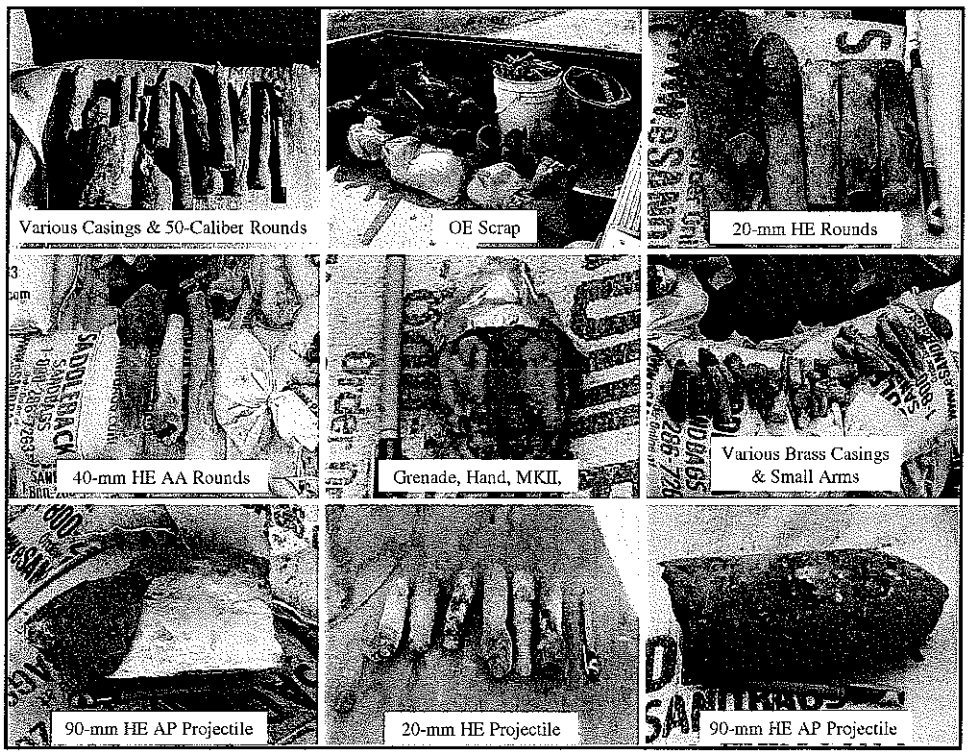

Oversize material stockpiled after the initial mechanical sifting
Large concrete rubble taken to an area near IRP Site 7 and mechanically broken and pulverized
Clean soil being loaded and hauled to a temporary stockpile area near IRP Site 7

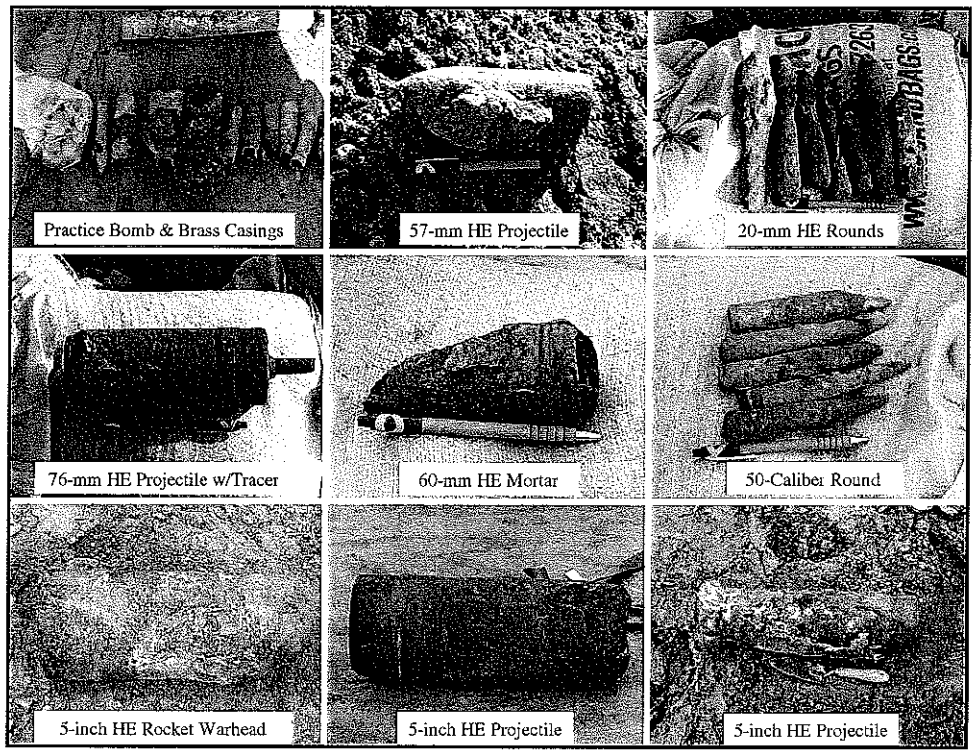

5-inch Drill Round
57-mm HE Projectile
20-mm HE Round
37-mm HE Projectile
Point Detonating Fuse
40-mm Casing Base
Various OE in Crusted Soil
20-mm Casing w/Broken off Projectile
20-mm Casing w/Broken off Projectile

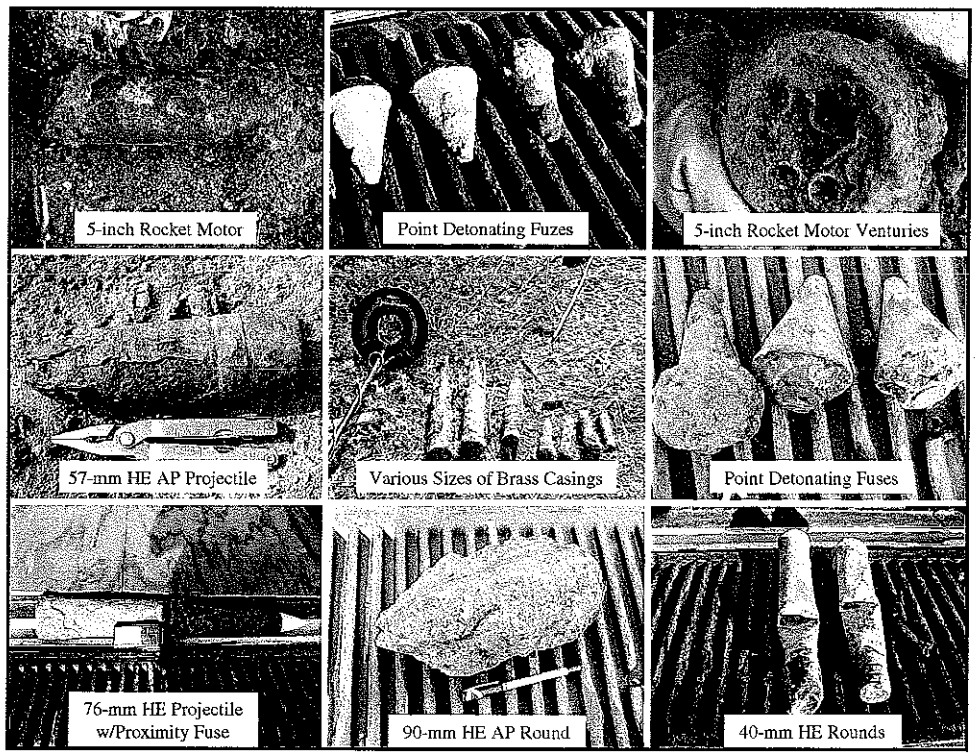

20-mm HE Round
Suspected 1.1-inch Projectile
50-Caliber AP Round
60-mm HE Mortar
60-mm HE Mortar
Various Brass Casings
90-mm HE AP Projectile
90-mm HE AP Projectile Base w/Exposed HE
57-mm HE Projectile

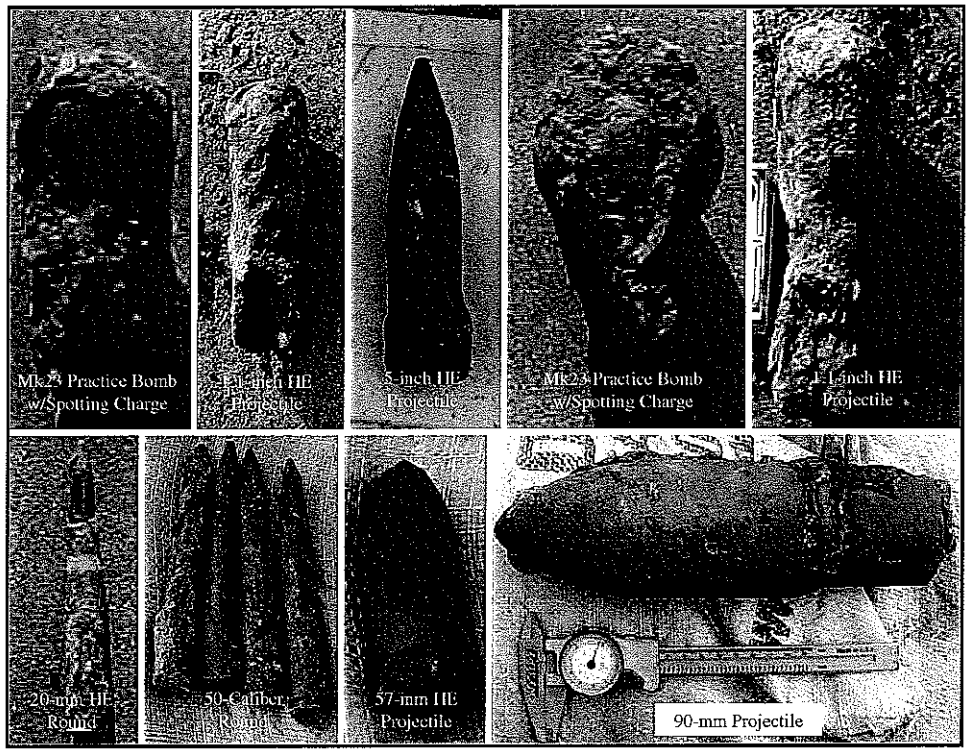


Additional pictures of OE items found at IRP Site



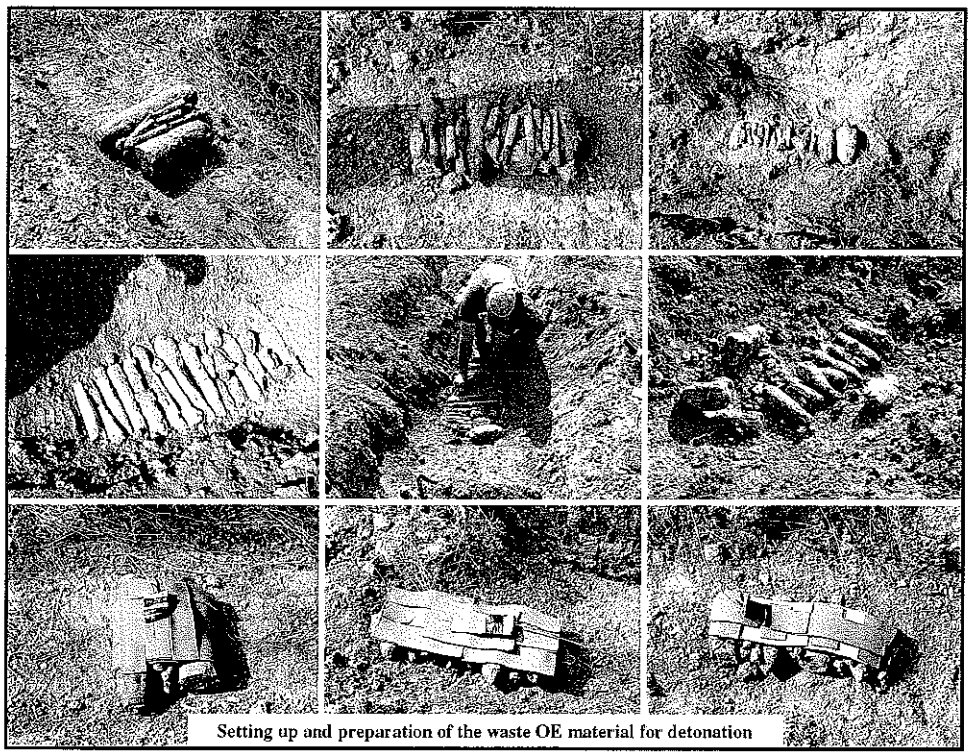

Practice Bomb & Brass Casings
57-mm HE Projectile
20-mm HE Rounds
76-mm HE Projectile w/Tracer
60-mm HE Mortar
50-Caliber Round
5-inch HE Rocket Warhead
5-inch HE Projectile
5-inch HE Projectile


5-inch Rocket Motor
Point Detonating Fuzes
5-inch Rocket Motor Venturies
57-mm HE AP Projectile
Various Sizes of Brass Casings
Point Detonating Fuses
76-mm HE Projectile w/Proximity Fuse
90-mm HE AP Round
40-mm HE Rounds

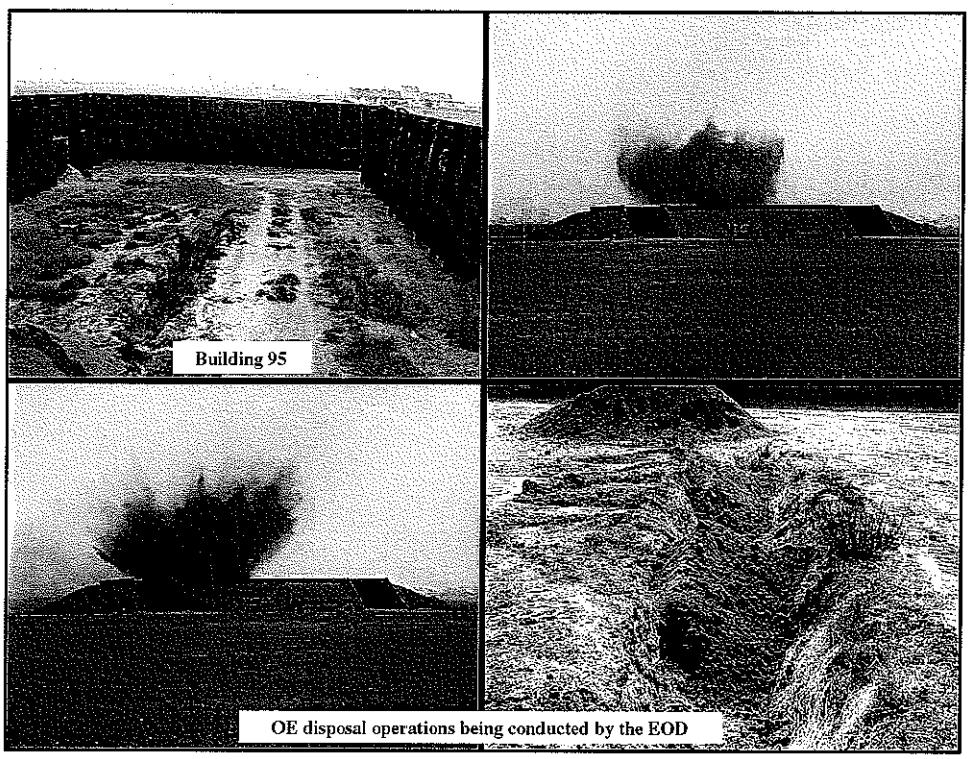

Mk23 Practice Bomb w/Spotting Charge
5-inch HE Projectile
Mk23 Practice Bomb w/Spotting Charge
5-inch HE Projectile
20-mm HE Round
50-Caliber Round
57-mm HE Projectile
90-mm Projectile

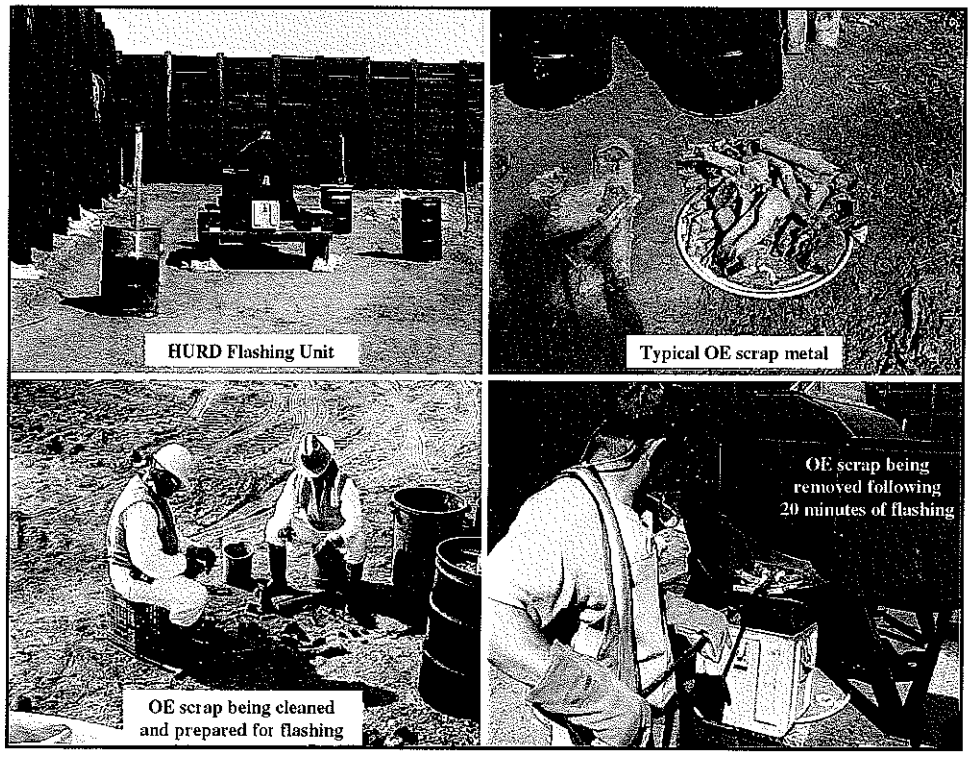

5-inch HE Rocket Warhead
Point Detonating Nose Fuses
20-mm HE Rounds
40-mm HE Rounds
Hand Grenade, Mk II

Miscellaneous OE scrap waste that would be crushed and made unrecognizable as OE waste and hauled off site for recycling



Setting up and preparation of the waste OE material for detonation


Building 95
OE disposal operations being conducted by the EOD


HURD Flashing Unit
Typical OE scrap metal
OE scrap being cleaned and prepared for flashing
OE scrap being removed following 20 minutes of flashing